ANNEXURE - I

GOA UNIVERSITY

FIRST YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING (Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER I (Common for all branches of Engineering)

Sub code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
					Th. Dur (Hrs)	Marks				
		L	T	P		Th.	S	P	O	Total
1.1	Applied Mathematics I	4	-	-	3	100	25	-	-	125
1.2	Applied Sciences - I (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
1.3	Basic Civil Engineering and Engineering Mechanics.	4	-	2	3	100	25	-	-	125
1.4	Basic Electrical Engineering	3	-	2	3	100	25	-	-	125
1.5	Engineering Graphics	2	-	4	4	100	50	-	-	150
1.6	Communication Skills	3	-		3	100	25	-	-	125
1.7	Workshop Practice - I	-	-	4	-	-	50	-	-	50
	TOTAL	20		14		600	250			850

L : Lectures, T : Tutorials, P : Practicals.
Th. Dur. : Duration of Theory Paper
Th : Theory, S : Sessional, P : Practical, O . Oral.

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FIRST YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING (Revised in 2007-08) SCHEME OF INSTRUCTION AND EXAMINATION

<u>SEMESTER II:</u> (Common for all branches of Engineering)

Sub code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
					Th Dur	Marks				
		L	T	P	(Hrs)	Th.	S	P	O	Total
2.1	Applied Mathematics II	4	-	-	3	100	25	-	-	125
2.2	Applied Sciences - II (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
2.3	Information Technology	4	-	2	3	100	25	-	-	125
2.4	Basic Mechanical Engineering	3	-	2	3	100	25	-	-	125
2.5	Basic Electronic Engineering	3	-	2	3	100	25	-	-	125
2.6	Environmental and Social Sciences	4	-	-	3	100	50	-	-	150
2.7	Workshop Practice - II Modern	-	-	4	-	-	50	-	-	50
	TOTAL	22		12	-	600	250	-	-	850

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SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2007-08

SE (CIVIL) SEM III

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Th.	S	O	P	Total
3.1	Applied Mathematics	3	1	-	3	100	25	-	-	125
3.2	Managerial Economics	3	1	-	3	100	25	-	-	125
3.3	Building Construction	3	1	2	3	100	25	-	25	150
3.4	Strength of Material	3	1	2	3	100	25	-	25	150
3.5	Concrete Technology	3	1	2	3	100	25	-	25	150
3.6	Fluid Mechanics-I	3	1	2	3	100	25	-	25	150
	TOTAL	18	06	08	-	600	50	-	100	850

NOMENCLATURE

L –Lectures   T –Tutorials   P:Practicals.
Th.Dur. -Duration of Theory Paper   Th-Theory   S- Sessional,
P- Practical,   O-Oral.

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GOA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2007-08

SE (CIVIL) SEM IV

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Th.	S	O	P	Total
4.1	Numerical Methods in Computer Programming	3	1	1	3	100	25	-	-	125
4.2	Structural Analysis-I	3	1	-	3	100	25	-	-	125
4.3	Fluid Mechanics-II	3	1		3	100	25	-		125
4.4	Surveying-I	3	1		3	100	25	-		125
4.5	Engineering Geology	3	1		3	100	25	-		125
4.6	Building Drawing-I	3	1		3	100	25	-		125
	Fluid Mechanics-II			2	-				25	25
	Surveying-I			2	-				25	25
	Geology			3	-				25	25
	Building Drawing-I			3	-				25	25
	TOTAL	18	06	11		600	150	-	100	850

NOMENCLATURE

L –Lectures   T –Tutorials   P:Practicals.
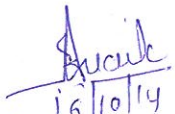Th.Dur. -Duration of Theory Paper Th-Theory   S- Sessional,
P- Practical,   O-Oral.

NOTE: 1.   12 lectures per module-unless otherwise specified
      2.   At least 8 experiments to be conducted based on the syllabus unless
            Otherwise specified

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SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2008-09

TE (CIVIL) SEM V

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th.Dur (Hrs)	Marks			
						Th.	S	P	Total
5.1	Structural Analysis-II	3	1	-	03	100	25	-	125
5.2	Geotechnical Engineering-I	3	1	-	03	100	25	-	125
5.3	Building Drawing-II	3	1		04	100	25	-	125
5.4	Design of Concrete Structures	3	1	-	03	100	25	..	125
5.5	Transportation Engineering-I	3	1	-	03	100	25	-	125
5.6	Design of Steel Structures-I	3	1	-	03	100	25	-	125
	Practical for subject 5.1	-	-	2	-	-	-	25	25
	Practical for subject 5.2	-	-	2	-	-	-	25	25
	Practical for subject 5.3	-	-	2	-	-	-	25	25
	Practical for subject 5.5	-	-	2	-	-	-	25	25
	TOTAL	18	06	08	-	600	150	100	850

NOMENCLATURE

L –Lectures   T –Tutorials   P:Practicals.

Th.Dur. -Duration of Theory Paper   Th-Theory   S- Sessional,

P- Practical,   O-Oral.

NOTE: 1.   12 lectures per module-unless otherwise specified
       2.   At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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SCHEME OF INSTRUCTION AND EXAMINATION

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TE (CIVIL) SEM VI

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th.Dur (Hrs)	Th.	S	P	Total
6.1	Structural Design & Detailing in Concrete	3	1	-	03	100	25	-	125
6.2	Transportation Engineering-II	3	1	-	03	100	25	-	125
6.3	Geotechnical Engineering-II	3	1	-	03	100	25	-	125
6.4	Environmental Engineering-i	3	1	-	03	100	25	-	125
6.5	Design of Steel Structures-II	3	1	-	03	100	25	-	125
6.6	Surveying-II	3	1	-	03	100	25	-	125
	Practical for subject 6.1	-	-	2	-	-	-	25	25
	Practical for subject 6.4	-	-	2	-	-	-	25	25
	Practical for subject 6.5	-	-	2	-	-	-	25	25
	Practical for subject 6.6	-	-	2	-	-	-	25	25
	TOTAL	18	06	08	-	600	150	100	850

NOMENCLATURE

L –Lectures   T –Tutorials   P:Practicals.
Th.Dur. -Duration of Theory Paper   Th-Theory   S- Sessional,
P- Practical,   O-Oral.

NOTE: 1.   12 lectures per module-unless otherwise specified
       2.   At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

B.E. (CIVIL) SEM VII (Revised Course)

Sub code C.E	Name of the subjects	Scheme of instruction Hrs/week			Scheme of Examination					
		L	T	P	Th. Dur (hrs)	Marks				
						Th	S	O	P	Total
7.1	Environmental Engg.II	3	1	2	3	100	25	25	-	150
7.2	Design of reinforced and prestressed concrete	3	1	2	3	100	25	25	-	150
7.3	Estimation and Costing	3	1	2	3	100	25	25	25	175
7.4	Elective I	3	2	0	3	100	25	25	-	150
7.5	Elective II	3	2	0	3	100	25	25	-	150
7.6	Civil Engg Project	-	-	4	-	-	25	50	-	75
	TOTAL	15	07	10	-	500	150	200	-	850

Elective I 7.4.1 Advanced Geotechnical Engineering
           7.4.2 Structural Dynamics
           7.4.3 Air Pollution
           7.4.4 Advanced Reinforced Concrete design
           7.4.5 Low Cost Housing

Elective II 7.5.1 Rock Mechanics
           7.5.2 Applied Engineering Geology
           7.5.3 Finite Elements in Civil Engineering
           7.5.4 Design of Hydraulic Structures

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SCHEME OF INSTRUCTION AND EXAMINATION

B.E. (CIVIL) SEM VIII (Revised Course)

Sub Code	Subject	Scheme of Instruction Hrs/Week			Scheme Of Examination					
					Th.Dur (Hrs)	Marks				
		L	T	P		Th.	S	O	P	Total
8.1	Irrigation and Water resource Engineering	4	2	-	3	100	25	50	-	175
8.2	Construction Project Management	4	2	0	3	100	25	50	-	175
8.3	Elective III	4	2	0	3	100	25	50	-	175
8.4	Elective IV	4	2	0	3	100	25	50	-	175
8.5	Civil Engg. Project	-	-	12	-	-	50	50+50	-	150
	TOTAL	12	08	12*	-	400	150	300	-	850

L-lecture, T: Tutorials, P-Practical
Th.Dur: Duration of the Paper
Th: Theory, S: Sessional, P: Practical, O: Oral

*50 marks for the project report and 50 marks for Orals (to be jointly assessed by both the examiners)

Elective III   8.3.1 Ground Improvement Techniques
                  8.3.2 Advanced Structural Analysis
                  8.3.3 Industrial Waste Treatment
                  8.3.4 Prestressed Concrete
                  8.3.5 Occupational safety and Health

Elective IV   8.4.1 Soil Dynamics and Machine Foundations
                  8.4.2 Advanced Engineering Geology
                  8.4.3 Earthquake Resistant Structures
                  8.4.4 Design of Bridge Structures

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FIRST YEAR OF BACHELOR'S DEGREE COURSE IN CIVIL ENGINEERING

(Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

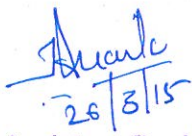**SEMISTER I: (Common for all branches of Engineering)**

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Marks				
						Th.	S	P	O	Total
1.1	Applied Mathematics I	4	-	-	3	100	25	-	-	125
1.2	Applied Science-1 (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
1.3	Basic Civil Engineering and Engineering Mechanics.	4	-	2	3	100	25	-	-	125
1.4	Basic Electrical Engineering	3	-	2	3	100	25	-	-	125
1.5	Engineering Graphics	2	-	4	4	100	50	-	-	150
1.6	Communication Skills	3	-	-	3	100	25	-	-	125
1.7	Workshop Practice-I	-	-	4	-	-	50	-	-	50
	TOTAL	20		14		600	250			850

L-Lectures-Tutorials-Practicals.
Th.dur-Duration of Theory Paper
Th-Theory, S-Sessional, P-Practical, O-Oral.

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(Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMISTER II: (Common for all branches of Engineering)

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Marks				
						Th.	S	P	O	Total
2.1	Applied Mathematics II	4	-	-	3	100	25	-	-	125
2.2	Applied Science-II (Physics & Chemistry)	4	-	2	3	100	50	-	-	150
2.3	Information Technology	4	-	2	3	100	25	-	-	125
2.4	Basic Mechanical Engineering	3	-	2	3	100	25	-	-	125
2.5	Basic Electronic Engineering	3	-	2	3	100	25	-	..	125
2.6	Environmental and Social Sciences	4	-	-	3	100	50	..	-	150
2.7	Workshop Practice-II	-	-	4	-	-	50	-	-	50
	TOTAL	22		12	-	600	250	-	-	850

L-Lectures-Tutorials-Practicals.
Th.dur-Duration of Theory Paper
Th-Theory, S-Sessional, P-Practical, O-Oral.

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SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2007-08

SE (CIVIL) SEM III

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Th.	S	O	P	Total
3.1	Applied Mathematics	3	1	-	3	100	25	-	-	125
3.2	Managerial Economics	3	1	-	3	100	25	-	-	125
3.3	Building Contruction	3	1	2	3	100	25	-	25	150
3.4	Strength of Material	3	1	2	3	100	25	-	25	150
3.5	Concrete Technology	3	1	2	3	100	25	-	25	150
3.6	Fluid Mechanics-I	3	1	2	3	100	25	-	25	150
	TOTAL	18	08	06	-	600	150	-	100	850

NOMENCLATURE

L –Lectures
Th.Dur. -Duration of Theory Paper
P- Practical,

T –Tutorials
Th-Theory
O-Oral.

P:Practicals.
S- Sessional,

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REVISED COURSE IN 2007-08

SE (CIVIL) SEM IV

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Th. Dur (Hrs)	Scheme Of Examination				
		L	T	P		Th.	S	O	P	Total
4.1	Numerical Methods in Computer Programming	3	1	1	3	100	25	-	-	125
4.2	Structural Analysis-I	3	1	-	3	100	25	-	-	125
4.3	Fluid Mechanics-II	3	1		3	100	25	-		125
4.4	Surveying-I	3	1		3	100	25	-		125
4.5	Engineering Geology	3	1		3	100	25	-		125
4.6	Building Drawing-I	3	1		3	100	25	-		125
	Fluid Mechanics-II			2	-				25	25
	Surveying-I			2	-				25	25
	Geology			3	-				25	25
	Building Drawing-I			3	-				25	25
	TOTAL	18	06	11		600	150	-	100	850

NOMENCLATURE

L –Lectures   T –Tutorials   P:Practicals.
Th.Dur. -Duration of Theory Paper   Th-Theory   S- Sessional,
P- Practical,   O-Oral.

NOTE: 1.   12 lectures per module-unless otherwise specified
2.   At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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REVISED COURSE IN 2008-09

TE (CIVIL) SEM V

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th.Dur. (Hrs)	Th.	S	P	Total
5.1	Structural Analysis-II	3	1	-	03	100	25	-	125
5.2	Geotechnical Engineering-I	3	1	-	03	100	25	-	125
5.3	Building Drawing-II	3	1		04	100	25	-	125
5.4	Design of Concrete Structures	3	1	-	03	100	25	-	125
5.5	Transportation Engineering-I	3	1	-	03	100	25	-	125
5.6	Design of Steel Structures-I	3	1	-	03	100	25	-	125
	Practical for subject 5.1	-	-	2	-	-	-	25	25
	Practical for subject 5.2	-	-	2	-	-	-	25	25
	Practical for subject 5.3	-	-	2	-	-	-	25	25
	Practical for subject 5.5	-	-	2	-	-	-	25	25
	TOTAL	18	06	08	-	600	150	100	850

NOMENCLATURE

L --Lectures   T –Tutorials   P:Practicals.

Th.Dur. -Duration of Theory Paper   Th-Theory   S- Sessional,

P- Practical,   O-Oral.

NOTE: 1.   12 lectures per module-unless otherwise specified

2.   At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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REVISED COURSE IN 2008-09

TE (CIVIL) SEM VI

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th.Dur. (Hrs)	Th.	S	P	Total
6.1	Structural Design & Detailing in Concrete	3	1	-	03	100	25	-	125
6.2	Transportation Engineering-II	3	1	-	03	100	25	-	125
6.3	Geotechnical Engineering-II	3	1	-	03	100	25	-	125
6.4	Environmental Engineering-I	3	1	-	03	100	25	-	125
6.5	Design of Steel Structures-II	3	1	-	03	100	25	-	125
6.6	Surveying-II	3	1	-	03	100	25	-	125
	Practical for subject 6.1	-	-	2	..	-	-	25	25
	Practical for subject 6.4	-	-	2	-	..	-	25	25
	Practical for subject 6.5	-	-	2	-	-	-	25	25
	Practical for subject 6.6	-	-	2	-	-	-	25	25
	TOTAL	18	06	08	-	600	150	100	850

NOMENCLATURE

L –Lectures
Th.Dur. -Duration of Theory Paper
P- Practical,

T –Tutorials
Th-Theory
O-Oral.

P:Practicals.
S- Sessional,

NOTE: 1.   12 lectures per module-unless otherwise specified
2.   At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

B.E. (CIVIL) SEM VII (Revised Course)

Sub code C.E	Name of the subjects	Scheme of instruction Hrs/week			Scheme of Examination					
		L	T	P	Th. Dur. (hrs)	Marks				
						Th	S	O	P	Total
7.1	Environmental Engg.II	3	1	2	3	100	25	25	-	150
7.2	Design of reinforced and prestressed concrete	3	1	2	3	100	25	25	-	150
7.3	Estimation and Costing	3	1	2	3	100	25	25	25	175
7.4	Elective I	3	2	0	3	100	25	25	-	150
7.5	Elective II	3	2	0	3	100	25	25	-	150
7.6	Civil Engg Project	-	-	4	-	-	25	50	-	75
	TOTAL	15	07	10	-	500	150	200	-	850

Elective I 7.4.1 Advanced Geotechnical Engineering
7.4.2 Structural Dynamics
7.4.3 Air Pollution
7.4.4 Advanced Reinforced Concrete design
7.4.5 Low Cost Housing

Elective II 7.5.1 Rock Mechanics
7.5.2 Applied Engineering Geology
7.5.3 Finite Elements in Civil Engineering
7.5.4 Design of Hydraulic Structures

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SCHEME OF INSTRUCTION AND EXAMINATION

B.E. (CIVIL) SEM VIII (Revised Course)

Sub Code	Subject	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Marks				
						Th.	S	O	P	Total
8.1	Irrigation and Water resource Engineering	4	2	-	3	100	25	50	-	175
8.2	Construction Project Management	4	2	0	3	100	25	50	-	175
8.3	Elective III	4	2	0	3	100	25	50	-	175
8.4	Elective IV	4	2	0	3	100	25	50	-	175
8.5	Civil Engg. Project	-	-	12	-	-	50	50+50	-	150
	TOTAL	12	08	12*	-	400	150	300	-	850

L-lecture, T: Tutorials, P-Practical
Th.Dur: Duration of the Paper
Th: Theory, S: Sessional, P: Practical, O: Oral

*50 marks for the project report and 50 marks for Orals (to be jointly assessed by both the examiners)

Elective III   8.3.1 Ground Improvement Techniques
                          8.3.2 Advanced Structural Analysis
                          8.3.3 Industrial Waste Treatment
                          8.3.4 Prestressed Concrete
                          8.3.5 Occupational safety and Health

Elective IV   8.4.1 Soil Dynamics and Machine Foundations
                          8.4.2 Advanced Engineering Geology
                          8.4.3 Earthquake Resistant Structures
                          8.4.4 Design of Bridge Structures

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GOA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2007-08

SE (CIVIL) SEM III

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Th.	S	O	P	Total
3.1	Applied Mathematics	3	1	-	3	100	25	-	-	125
3.2	Managerial Economics	3	1	-	3	100	25	-	-	125
3.3	Building Construction	3	1	2	3	100	25	-	25	150
3.4	Strength of Material	3	1	2	3	100	25	-	25	150
3.5	Concrete Technology	3	1	2	3	100	25	-	25	150
3.6	Fluid Mechanics-i	3	1	2	3	100	25	-	25	150
	TOTAL	18	06	08	-	600	50	-	100	850

NOMENCLATURE

L –Lectures   T –Tutorials   P:Practicals.
Th.Dur. -Duration of Theory Paper   Th-Theory   S- Sessional,
P- Practical,   O-Oral.

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SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2007-08

SE (CIVIL) SEM IV

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Marks				
						Th.	S	O	P	Total
4.1	Numerical Methods in Computer Programming	3	1	1	3	100	25	-	-	125
4.2	Structural Analysis-I	3	1	-	3	100	25	-	-	125
4.3	Fluid Mechanics-II	3	1		3	100	25	-		125
4.4	Surveying-I	3	1		3	100	25	-		125
4.5	Engineering Geology	3	1		3	100	25	-		125
4.6	Building Drawing-I	3	1		3	100	25	-		125
	Fluid Mechanics-II			2	-				25	25
	Surveying-I			2	-				25	25
	Geology			3	-				25	25
	Building Drawing-I			3	-				25	25
	TOTAL	18	06	11		600	150	-	100	850

NOMENCLATURE

L –Lectures   T –Tutorials   P:Practicals.
Th.Dur. -Duration of Theory Paper   Th-Theory   S- Sessional,
P- Practical,   O-Oral.

NOTE: 1.   12 lectures per module-unless otherwise specified
       2.   At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2008-09

TE (CIVIL) SEM V

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th.Dur (Hrs)	Marks			
						Th.	S	P	Total
5.1	Structural Analysis-II	3	1	-	03	100	25	-	125
5.2	Geotechnical Engineering-I	3	1	-	03	100	25	-	125
5.3	Building Drawing-II	3	1		04	100	25	-	125
5.4	Design of Concrete Structures	3	1	-	03	100	25	-	125
5.5	Transportation Engineering-I	3	1	-	03	100	25	-	125
5.6	Design of Steel Structures-I	3	1	-	03	100	25	-	125
	Practical for subject 5.1	-	-	2	-	-	-	25	25
	Practical for subject 5.2	-	-	2	-	-	-	25	25
	Practical for subject 5.3	-	-	2	-	-	-	25	25
	Practical for subject 5.5	-	-	2	-	-	-	25	25
	TOTAL	18	06	08	-	600	150	100	850

NOMENCLATURE

L –Lectures
Th.Dur. -Duration of Theory Paper
P- Practical,

T –Tutorials
Th-Theory
O-Oral.

P:Practicals.
S- Sessional,

NOTE: 1. 12 lectures per module-unless otherwise specified
2. At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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SCHEME OF INSTRUCTION AND EXAMINATION

REVISED COURSE IN 2008-09

TE (CIVIL) SEM VI

Sub Code	Name of the Subjects	Scheme of Instruction Hrs/Week			Scheme Of Examination				
		L	T	P	Th.Dur (Hrs)	Marks			
						Th.	S	P	Total
6.1	Structural Design & Detailing in Concrete	3	1	-	03	100	25	-	125
6.2	Transportation Engineering-II	3	1	-	03	100	25	-	125
6.3	Geotechnical Engineering-II	3	1	-	03	100	25	-	125
6.4	Environmental Engineering-I	3	1	-	03	100	25	-	125
6.5	Design of Steel Structures-II	3	1	-	03	100	25	-	125
6.6	Surveying-II	3	1	-	03	100	25	-	125
	Practical for subject 6.1	-	-	2	-	-	-	25	25
	Practical for subject 6.4	-	-	2	-	-	-	25	25
	Practical for subject 6.5	-	-	2	-	-	-	25	25
	Practical for subject 6.6	-	-	2	-	-	-	25	25
	TOTAL	18	06	08	-	600	150	100	850

NOMENCLATURE

L –Lectures	T –Tutorials	P:Practicals.
Th.Dur. -Duration of Theory Paper	Th-Theory	S- Sessional,
P- Practical,	O-Oral.	

NOTE: 1. 12 lectures per module-unless otherwise specified
2. At least 8 experiments to be conducted based on the syllabus unless Otherwise specified

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GOA UNIVERSITY

FINAL AND/FOURTH YEAR OF BACHELORS DEGREE COURSE IN CIVIL ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

B.E. (CIVIL) SEM VII (Revised Course)

Sub code C.E	Name of the subjects	Scheme of instruction Hrs/week			Scheme of Examination					
		L	T	P	Th. Dur (hrs)	Marks				
						Th	S	O	P	Total
7.1	Environmental Engg.II	3	1	2	3	100	25	25	-	150
7.2	Design of reinforced and prestressed concrete	3	1	2	3	100	25	25	-	150
7.3	Estimation and Costing	3	1	2	3	100	25	25	25	175
7.4	Elective I	3	2	0	3	100	25	25	-	150
7.5	Elective II	3	2	0	3	100	25	25	-	150
7.6	Civil Engg Project	-	-	4	-	-	25	50	-	75
	TOTAL	15	07	10	-	500	150	200	-	850

Elective I 7.4.1 Advanced Geotechnical Engineering
7.4.2 Structural Dynamics
7.4.3 Air Pollution
7.4.4 Advanced Reinforced Concrete design
7.4.5 Low Cost Housing

Elective II 7.5.1 Rock Mechanics
7.5.2 Applied Engineering Geology
7.5.3 Finite Elements in Civil Engineering
7.5.4 Design of Hydraulic Structures

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GOA UNIVERSITY
FINAL AND/FOURTH YEAR OF BACHELORS DEGREE COURSE IN CIVIL ENGINEERING
(Revised in 2007-08)
SCHEME OF INSTRUCTION AND EXAMINATION

B.E. (CIVIL) SEM VIII (Revised Course)

Sub Code	Subject	Scheme of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Th.	S	O	P	Total
8.1	Irrigation and Water resource Engineering	4	2	-	3	100	25	50	-	175
8.2	Construction Project Management	4	2	0	3	100	25	50	-	175
8.3	Elective III	4	2	0	3	100	25	50	-	175
8.4	Elective IV	4	2	0	3	100	25	50	-	175
8.5	Civil Engg. Project	-	-	12	-	-	50	50+50	-	150
	TOTAL	12	08	12*	-	400	150	300	-	850

L-lecture, T: Tutorials, P-Practical
Th.Dur: Duration of the Paper
Th: Theory, S: Sessional, P: Practical, O: Oral

*50 marks for the project report and 50 marks for Orals (to be jointly assessed by both the examiners)

Elective III   8.3.1 Ground Improvement Techniques
                8.3.2 Advanced Structural Analysis
                8.3.3 Industrial Waste Treatment
                8.3.4 Prestressed Concrete
                8.3.5 Occupational safety and Health

Elective IV   8.4.1 Soil Dynamics and Machine Foundations
                8.4.2 Advanced Engineering Geology
                8.4.3 Earthquake Resistant Structures
                8.4.4 Design of Bridge Structures

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B. E. (CIVIL)

SEM. III TO VIII

Sr No.	Subject	Scheme of Instructin Periods/week			Scheme of Examination					
		L	T	P	Dur-ation in hour	Theory	Pr. acti cal	TW eo rr m k	Or a l	TOTAL
1.	Engineering Mathematics III	4	1	—	3	100	—	—	—	100
2.	Engineering Geology I	4	—	—	3	100	—	—	—	100
3.	Strength of Materials	4	2	4	3	100	—	25	—	125
4.	Engineering Economics	4	—	—	3	100	—	—	—	100
5.	Surveying I	4	1	6	3	100	—	50	–	150
6.	Hydraulics I	4	2	4	3	100	—	25	—	125
	Total	24	6	14		600	—	100	—	700

S. E. Civil Sem. IV

Sr No.	Subject	L	T	P	Dur-ation in hour	Theory	Pr. acti cal	TW eo rr m k	Or a l	TOTAL
1.	Numerical Methods in Civil Engg.	4	—	2	3	100	—	25	–	125
2.	Hydraulics II	4	2	2	3	100	—	25	25	150
3.	Syrveying II	4	2	3	3	100	50	25	—	175
4.	Engineering Geology II	4	—	2	3	100	25	25	—	150
5.	Building Construction	4	2	3	3	100	—	25	25	150
6.	Building Drawing I	1	—	6	4	100	25	25	25	175
	Total	21	6	18		600	100	150	75	925

Elective III - Sem. VIII

1. Rock Mechanics
2. Structural Dynamic Structures
3. Industrial Waste Treatment
4. Design Hydraulics.
5. Advanced Prestressed Concrete.
6. Off Shore structure.
7. Application of FEM to Civil Engineering.
8. Soil Foundation Structure Interaction.

S. E. CIVIL SEM. III

ENGINEERING MATHEMATICS III

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	1	—	3 hrs	100	—	—	—	100

1. Laplace Transforms :

   Laplace transforms of elementary functions, their derivatives and integrals. Inverse transforms, Convolution theorem, Solutions of Linear and simultaneous differential equations. Applications to Civil Engineering problems.

2. Fourier Series :

   Fourier coefficients, Dirichlet conditions - Expansion of functions - Even and odd functions - Half range series (Ranges over (c, c + 2 π, (a, a, +2 1).

3. Partial Differential Eqautions, Transverse vibrations of an elastic string. Fourier series solutions, Steady state Heat flow in one and two dimensions, variable heat flow in one dimension.

4. Matrics :

   Types, adjoint, inverse of matrices. Elementary transformations - Rank, Reduction to canonical form - partitioning - solutions of equations AX = 0, AX = B.

5. Statistics :
   Probability distributions, binomial, Poisson's distributions - continuous random variable, normal distribution, correlation, lines of regression - rank correlation.

SUGGESTED REFERENCES

1. A text book of Applied Mathematics - P. N. and J. N. Wartikar.
2. Higher Mathematics for Engineering and Physiists - I. S. and E. S. Sokolnikoff.
3. Text book of Matrices - Shanti Narayan.
4. Higher Engineering Mathematics - Grewal.
5. A first course in statisticas - Weatherburn.

ENGINEERING GEOLOGY - I

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	1	—	3 hrs	100	—	—	—	100

1. Introduction :
   Object scope and sub-divisions.

2. General Geology :
Surface relief of the earth, agents modifying the earth, Weathering, erosion, denudation and deposition. Geological action of rivers, wind, glaciers, sea and the related resulting land forms. Lakes and lacustrine deposits. Earth movements, volcanism, mountains and earthquakes.

3. Mineralogy :
Composition of the earth crust, silicate and non-silicate minerals, rock forming minerals primary and secondary minerals as prescribed in the practical course.

4. Petrology :
Igneous, sedimenatary, metamorphic

Igneous Petrology : Mode of occurence, Textures and structures, Relation between mode of occurence, condition of cooling and textures Hatch's scheme of classification, study of common igneous rock types as prescribed in practical course.

Sedimentary petrology : Mode of formation, causes, sites and conditions of deposition. Types of deposits, Consolidation by cementation and welding. Classification. Mineral composition : Textural characteristics of shallow water deposits. Study of sedimentary rock types prescribed in the practical course.

Metamorphic petrology : Metamorphism. Agents of metamorphism. Metamorphism minerals and structures contact, dynamothermal, plutonic and cataclastic metamorphism. Study of common metamorphic rock types as prescribed in the practical course.

5. Structural Geology :
Structural elements of rocks, dip and strike, out crop patterns, relation of nature of out crops with structure and relief. Unconformities and overlaps. Inliers and outliers. Different types of joints, folds and faults. Importance of structural elements in engineering operations.

SUGGESTED REFERENCES

1. Text book of Geology by P. K. Mukherjee.
2. Rutley's elements of Mineralogy - by H. H. Read.
3. Principles of petrology - by G. W. Tyrrel.
4. Principles of physical geology - by Arthur Holmes.
5. Introduction to physical Geology - by Longwell & Flint.
6. Engineering and General Geology - by Prabin Singh.
7. Structural Geology - by Billings M. P.

STRENGTH OF MATERIALS

Sceme of Instruction				Scheme of Examination				
Periods per week						Marks		
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	2	4	3 hrs	100	—	25	—	125

1. Shearing force and bending moment :
Axial thrust, shearing force and bending moment diagrams for statically determinate frames for different types of loading - The relationship between rate of loading shear force and bending moment.

2. Simple theory of bending :
Flexure formula for straight prismastic beams, moment of inertia for plane sections. Simple problems in application of flexure formula, section modulus, moment of resistance, Flitched beams. Beam of uniform strength, leaf spring.

3. Shear stresses in beams :
Distribution of shear stresses across plane sections used commonly for structural purposes.

2. General Geology :
Surface relief of the earth, agents modifying the earth, Weathering, erosion, denudation and deposition. Geological action of rivers, wind, glaciers, sea and the related resulting land forms. Lakes and lacustrine deposits. Earth movements, volcanism, mountains and earthquakes.

3. Mineralogy :
Composition of the earth crust, silicate and non-silicate minerals, rock forming minerals primary and secondary minerals as prescribed in the practical course.

4. Petrology :
Igneous, sedimenatary, metamorphic

Igneous Petrology : Mode of occurence, Textures and structures, Relation between mode of occurence, condition of cooling and textures Hatch's scheme of classification, study of common igneous rock types as prescribed in practical course.

Sedimentary petrology : Mode of formation, causes, sites and conditions of deposition. Types of deposits, Consolidation by cementation and welding. Classification. Mineral composition : Textural characteristics of shallow water deposits. Study of sedimentary rock types prescribed in the practical course.

Metamorphic petrology : Metamorphism. Agents of metamorphism. Metamorphism minerals and structures contact, dynamothermal, plutonic and cataclastic metamorphism. Study of common metamorphic rock types as prescribed in the practical course.

5. Structural Geology :
Structural elements of rocks, dip and strike, out crop patterns, relation of nature of out crops with structure and relief. Unconformities and overlaps. Inliers and outliers. Different types of joints, folds and faults. Importance of structural elements in engineering operations.

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1. Text book of Geology by P. K. Mukherjee.
2. Rutley's elements of Mineralogy - by H. H. Read.
3. Principles of petrology - by G. W. Tyrrel.
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6. Engineering and General Geology - by Prabin Singh.
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STRENGTH OF MATERIALS

Sceme of Instruction				Scheme of Examination				
Periods per week						Marks		
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	2	4	3 hrs	100	—	25	—	125

1. Shearing force and bending moment :
Axial thrust, shearing force and bending moment diagrams for statically determinate frames for different types of loading - The relationship between rate of loading shear force and bending moment.

2. Simple theory of bending :
Flexure formula for straight prismastic beams, moment of inertia for plane sections. Simple problems in application of flexure formula, section modulus, moment of resistance, Flitched beams. Beam of uniform strength, leaf spring.

3. Shear stresses in beams :
Distribution of shear stresses across plane sections used commonly for structural purposes.

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4. Simple theory of Torsion :
   Torsion of circular shafts - solid and hollow, stress in shaft when transmitting power, close coiled helical springs.

5. Bending combined with axial loads :
   Eccentric loading of sections, core of circular and rectangular sections. Application to problems of chimneys, retaining walls etc.

6. Principal stresses :
   General equations for the transformation of stress-principal stresses- normal and shear. Their determination using Mohr's circle. Principal planes. Principal stresses in beams subjected to bending and shear. Principal stresses in shafts subject to torsion bending and axial thrust.

7. Deflection of statically determinate structures :
   Deflection of Beam, double integration and Macaulay's methods, Mohr's theorems, moment area method and conjugate beam method Maxwell's Law of Reciprocal Deflections and principal of super position of forces.

8. Struts :
   Struts subjected to axial loads, effect of end condition, theories and use of empirical design formulae. Euler's and Rankine's formulae.

TERM WORK

The term work consists of the following :
1. Laboratory work of at least Eight experiments including the following :
   i) Tension test in steel bars.
   ii) Compression test on Concrete stone/bricks etc.
   iii) Shear test on steel bar.
   iv) Flexure test on Timber/Tile

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v) Impact test.
vi) Verification of Maxwell's law of Reciprocal Deflections.
vii) Principle of superposition of forces.
viii) Struts with different end conditions.

2. At least 20 problems based on the syllabus.

SUGGESTED REFERENCES

1. Junnarkar, S. B. Mechanics of Materials Vol. I
2. Thadant B. N. and Desai J. P. "Strength of Materials".
3. Singer F. L. "Strength of Materials".
4. Buchanan, "Mechanics of Materials".
5. Popov "Mechanics of Materials".
6. Ramanrutham S. "Strength of Materials".

ENGINEERING ECONOMICS

Sceme of Instruction				Scheme of Examination				
Periods per week						Marks		
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	—	—	3 hrs	100	—	—	—	100

1. Scope of Engineering Economics.

2. Demand analysis and forecasting. Principles of Demand - Elasticity of Demand - Advertising and demand - Forecasting - Factors involved in forcasting - Regression Equation and forecasting.

3. Cost concept and classifications :
   Fixed and variable costs, methods of least square - Direct Material, Labour and overhead cost.

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4. Cost output relationship :
Cost functions - Linear and Quadratic cost functions - Cubic cost function - Cost output relationship. Measurement - Law of supply - Elasticity of supply - concept of Equilibrium.

5. Production function and Measurement - Cost Control and cost Reduction - Calculation of variance.

6. Princing and output decisions :
Perfect and Imperfect competition pricing methods - product line pricing.

7. Profit Management :
(a) Measuring profit - Depreciation - Method to provide depreciation - Annual cost analysis - Total cost analysis - Minimum cost analysis.
(b) Profit planning and Forecasting : Break Even Analysis - Break even Chart - Safety margin - BEP in multiproduct firm - BEP with changes in cost and price - make or buy decision - production planning - profit forecasting.

8. Apprising project profitability - Methods :
Rate of Return - discounted cash flow - net present value index - Empirical studies (case study on project profitability).

9. Legal ownership and size of the firm :
Sole propritorship - Partnership - joint stock company - Co-operative Society - Public sector Department.

SUGGESTED REFERENCES

1. Micro Economic Theory - A Mathematical Approach Henderson and Quandt.
2. Managerical Economics - Varshney and Maheswari.
3. Economics of Engineering works - R. C. singh.
4. Business Organisation and Management - M. C. shukla.
5. Managerial Economics — Bails & Peeper

SURVEYING - I

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	1	6	3 hrs	100	—	50	—	150

1. Chain Surveying :
Various types of tapes and chains, Instruments for setting right angles. Conventional signs, chaining, random and reciprocal ranging, chaining on sloping ground, Errors in chaining. Principles of chain surveying Terms commonly used in chain surveying, offsetting obstacles in chaining. Booking field notes.

2. Compass Surveying :
Magnetic and truemeridian, Dip, declination and its variation - Local attraction. Prismatic and Surveyors compass. Whole circle and reduced bearings. Fore and back bearings. Traverse survey with comapss and chain. Plotting of traverse by bearing and included angles. Closing error and its correction by graphical methods.

3. Plane Table Surveying :
Plane table and its accessories. Methods of plane tabling. Orientation. Two and three point problems. Accuracy of plane table survey.

4. Levelling :
Principles of levelling, Definition of terms used. Dumpy level and tilting level. Levelling staff, simple and differential levelling. Reduction of levels. Difficulties in levelling, Curveture and refraction correction. Sensitiveners of bubble tube. Longitudinal sectioning and cross sectioning. Errors in levelling. Reciprocal levelling. Booking staff readings.

5. Minor Instruments and Measurement of Areas :
Measurement of area by Trapozoidal and Simpson's rule.

Use of planimeter, Abney level, hand level, clinometers, sextants, Line ranger, optical and prism squares.

TERM WORK

The term work shall consists of :

1. Assignment problems on the above topics.

2. Minimum 3 sheets covering chain and compass survey, plane table survey, longitudinal and cross sectioning of Road project along with field book.

SUGGESTED REFERENCES

1. Plane and Geodetic Surveying by David Clark.

2. Surveying Vol. I - Dr. B. C. Punmia.

3. Surveying and levelling Vol. I - Kanetkar and Kulkarni.

HYDRAULICS - I

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	2	4	3 hrs	100	—	25	—	125

1. Introduction :
   Physical properties of Fluids.

2. Fluid Statics :
   Pressure variation and measurement of pressure, forces on plane and curved surfaces, buoyancy, stability of floating and submerged bodies.

3. Kinematics of Fluid Flow :
   Types of flow, one, two and three dimensional flows, velocity and acceleration. One dimensional continuity equa-

tion, rotational and irrotational flow, circulation and vortacity, stream and potential functions.

4. Dynamics of Fluid Flow :
   Equation of motion along a stream line, Euler's equation, Bernoulli's equation and applications. Pitot tube, Prandtl's tube, steady and unsteady flow through orifices and mouth pieces, venturi, orifice and flow nozzle meters. Rotameter, notches and weires. Impulse momentum equations, force on a bend and vortex motion.

5. Flow through Conduits :
   Laminar and turbulent flows, Reynold's experiment, Darcy-Weisbech equation, Chezy's equation, minor losses in pipes and fittings.

6. Viscous Flow :
   Laminar flow between two parallel plates, Couette flow, flow through circular pipe, circular annulus, transition from laminar to turbulent flow.

7. Ideal Fluid Flow :
   Uniform flow, source, sink, doublet, uniform flow around a source, flow around a sphere, flow with circulation and lift.

8. Flow through pipes :
   Hydraulic gradient, total energy line, pipes in series and parallel, equivalent pipe, branching pipes - Simple applications. Pipe flow with varying discharges (laterates) Syphons, Transmission of power through pipes - friction charts and their uses.

TERM WORK

The term work shall include at least eight experiments based on the above syllabus and eight assignments.

The laboratory work as recorded in the journal alongwith the assignments shall be counted as term work.

SUGGESTED REFERNCES

1. Massey, B. S. "Mechanics of Fluids:

2. Jagadish Lal " Hydraulics and Fluid Mechanics"

3. Modi and Seth " Hydraulics and Fluid Mechanics"

S. E. CIVIL SEM. IV

NUMERICAL METHODS IN CIVIL ENGINEERING

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	—	2	3 hrs	100	—	25	—	125

1. Matrices :
   Eigen values and vectors. Diagonalisation, Functions of square matrices, quadratic forms - real field. Canonical reduction, similarity transformation. Rank, index and signatures of a Q. F. Definite and semi definite forms.

2. Finite Differences :
   Forward, Backward and Central Differences, Operators - factorial polynomial, interpolation formulae : forward, backward, central. Lagrange interpolation - Divided differences formula. Solution of linear algebraic simultaneous equations, Gauss elimination, Gauss - Seidel and Jacobi iterative methods.

3. Newton - Raphson, Regula-fls fals bisection chord methods for solving transcendental equations, converagonce criteri.

4. Numerical Differentiation and Integration :
   Formulae for first and second derivatives, Trapezoidal, Simpson's 1/3, 3/8 Rules. Richardson Extrapolation.

5. L.D.E. :
   First and second order linear equations. Numerical solution: Taylor series, Euler's, modified Euler's, Runge - Kutta, Picards and Milne's P. C. methods.

TERM WORK

Term work shall consist of at least 15 assignments based on the above syllabus, out of which at least 2 assignments should include writing computer programmes. The assignments are to be relevant to Civil Engineering Applications.

SUGGESTED REFERENCES

1. A text book of applied Mathematics - P. N. and J. N. Wartikar.

2. Numerical Analysis - F. Scheid (Schaum series)

3. Matrices - Frank Ayres (Schaum series)

4. Computer oriented numerical methods - Rajaraman

HYDRAULICS - II

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	2	2	3 hrs	100	—	25	25	150

1. Dimensional Analysis :
Scope : principles - Raleigh's - Buckingham's and other methods. Dimensional ratios - applications. Similarity laws-model studies - Unidistorted models.

2. Pipe Systems :
Hydraulic analysis of pipe networks. Hardy-cross method. Water hammer and surge systems.

3. Free surface flow :
a) Uniform flow through open channels, Chezy and Mannings equations. Hydraulically efficient sections, velocity distribution in open channels.
b) Non uniform flow - concept of specific energy, venturi - flume, raised channel bed and transition.
Equation of gradually varied flow. Computations of surface profiles by direct step and other methods. Rapidly varied flow - Hydraulic jump and its analysis. Use of jump as an energy dissipator.

4. Boundary Layer :
Concepts - Displacement and momentum thickness, Laminar and turbulent boundary layer equation. Laminar sublayer momentum integral equation, pressure distribution - flow past flat plate, drag coefficient - separation.

5. Turbulent flow in pipes :
Mechanism of turbulence - semi-empirical theories of turbulence - Prandtl's mixing length concept - Universal velocity distribution law. Velocity distribution in smooth and rough pipes-Karman-Prandtl velocity distribution equations-velocity defect law-friction-friction factor in turbulent flow.

TERM WORK

The term work shall include at least six experiments based on the above syllabus and six assignments.

The laboratory work as recorded in the journal alongwith the assignments shall be counted as term work.

The oral examination based on the term work syllabus.

SUGGESTED REFERENCES

1. Massey, B. S. " Mechanics of Fluids"

2. Jagadish Lal " Hydraulics and Fluid Mechanics"

3. Modi and Seth " Hydraulics and Fluid Mechanics".

SURVEYING - II

| Sceme of Instruction | | | | Scheme of Examination | | | | |
| Periods per week | | | | | | Marks | | |
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	2	3	3 hrs	100	50	25	—	175

1. Controuring :
Introduction, Contour interval, methods of contouring, Interpolation of contours, Uses of contour maps.

2. Transit Theodolite :
Parts, Optics and qualities of transits. Temporary and permanent adjustments. Repetition and reiteration method of measuring horizontal angles. Bearing of a line, Traverse survey. Methods of Balancing traverse, Gales traverse table, Adjustments of closing error. Measurement of vertical angles. Omitted measurements. use of theodolite as a level.

3. Curves :
Simple, Compound and reverse curves, methods of setting above curves. Transition curves, Necessity, requirements and method of introducing superelevation, properties of composite curves, Clothoid, cubic and spiral curves, Burnolli's leminiscate, methods of setting transition curves. Vertical curves, sight distances. methods of setting - vertical curves.

4. Trignometric Levelling :
Introduction, Heights and distance with base of the object accessible, Base of the object inaccessible, with instrument stations in the same vertical plane as the elevated object and instrument station not in the same vertical plane as the elevated object.
Geodetical observations : Terrestrial refraction, curvetures and refraction correction for observed angles, Axissignal correction methods of trignometrical levelling.

5. Setting out works :
Setting out buildings, culverts, bridges, tunnels, surface, survey, Instrument for setting out tunnels, surface alignments setting from ends, Transforming the alignment underground, transferring levels underground. Accuracy in tunnel surveying.

TERM WORK

The term work consist of :
1. Minimum two drawings on a) Contouring
   b) Theodolite Traverse with gales traverse table.

2. Assignment problems on the above topics.

3. Other field exercise on above topics with field book & report.

Practical Examination
The Practical Examination shall be based on the above syllabus and field work

SUGGESTED REFERENCES

1. Plane and Geodetic surveying by David Clark.
2. Higher and Geodetic surveying by David Clark.
3. Surveying Vol. II and III by Dr. B. C. Punmia.
4. Surveying Vol. II by Kanetkar and Kulkarni.

ENGINEERING GEOLOGY - II

Sceme of Instruction				Scheme of Examination				
Periods per week					Marks			
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	—	2	3 hrs	100	25	25	—	150

1. Indian Stratigraphy : General principles of stratigraphy. Divisions of geological time. Physiographic divisions of India and their characteristics. Geological history of peninsula. Study of formations in the peninsula. Important economic minerals and building stones in India.

2. a) Preliminary geological investigations and their importance in engineering, use of geological maps and sections. Verification and correlation of surface data with the results of sub-surface exploration.

b) Significance of geological structures such as stratifications, dips, joints, folds, faults, crushed zones, fault zones, dykes etc. in engineering operations. Earthquake zone and precautions to be taken while chosing sites for building in seismic zones.

c) Geology of Dam Sites : Strength stability and water-tightness of foundation rocks and their physical characteristic and geological structures. Geological conditions and choice of types of dams. Suitable and unsuitable conditions for locating dams. Structural and erosional valleys, precautions to be taken to counteract unsuitable conditions. Treatment of faults, dykes, crushed zones, joints, unfavourable dips etc.

d) Geology of reservoir sites : Geology of catchment area, dependence of water tightness on physical properties and structures of rocks. Geological conditions suitable and unsuitable for reservoir sites. Importance of ground water studies and effect of rising of water tables.

e) Tunneling : important geological considerations while choosing sites, Difficulties during tunnelling as related with lithology, nature and structure of material to be excavated. Geological conditions to be avoided.

f) Landslides : Causes, geological formation which influence. landslides. Influence of dip and slopes, safe and unsafe slopes, terminal creep, precautions to be taken while making cuts in hill sites.

g) Ground water : Water table. perched water table, storage and circulation, porosity and permeability of rocks. Influence of structures of rocks, Geological work of ground water. Springs and seepage sites and geological structures. Wells and bore wells. Fluctuations in water level. Artesian well, and different types of rocks as source of ground water.

h) Building stones : Requirements of good building stones. Suitability of common rocks and building stones.

TERM WORK

Practical work carried out during semester and recorded in a journal shall be counted as term work.

PRACTICAL EXAMINATION

Practical examination will be based on the practical work done during the semester.

PRACTICAL COURSE

1. Identification of following minerals and ores in hand specimen : Quartz and its varities, common varities of chaloedony, opal, orthoclase, microcline, plagioclase, muscovite, biotic, chlorite, hornblende, actinolite, asbestos, augite, olivine, serpentine, garnet, zeolite, Beryl, corundum talc, gypsum, barytes, calcite, graphite, kyanite, topaz, tourmaline, limonite, haematite, magnetite, pyrite, chromite, galena, pyrolusite, Bauxite.

2. Indentification of following rocks in hand specimens : Granites and its varities, syenite, diorite, gabbro, Rhyolite trachyte, andesite, basalt and its varities obsidian, pumice, tachylyte, pegmatite, dolerite - porphyry, conglomerate breccia grit, arkose sandstones and its varities, shale mud stone limestone and its varities, quartzite, slate, gneiss, schists marble.

3. Geological maps reading and construction of sections from single contour geological maps.

4. Solution of simple engineering problems. based on geological maps studied during the practical course.

5. Report based on visits to places of geological and engineering interest.

SUGGESTED REFERENCES

1. Engineering Geology and Geotechnics by D. P. Krynine and W. R. Judd.

2. Geology for Engineering by Legget.

3. Engineering and General geology by Prabin singh.

4. Geology for engineers by Blyth and others.

5. Text book of Engg. Geology by Dr. R.B. Gupte

6. Mining Geology by Mekinstry

BUILDING CONSTRUCTION

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
5	1	2	3 hrs	100	—	50	50	150

1. Masonary Construction :
    a) Stone masonry; classification, dressing, bonding, pointing, joints, scaffolding.
    b) Brick masonry : Classification, bonding, joints, scaffolding, Cavity walls, reinforced brick work, partition walls.
    c) Hollow concrete blocks masonary.
    d) Use of stabilised mud blocks in Housing.

2. Plastering, Pointing, surface Finishing :
    a) Plastering : Types, special materials, defects, application of mortar.
    b) Pointing : Types.

3. Doors and Windows :
    Types, design, location, various materials uses (like timber, steel, alluminium etc.)

4. Floors :
    Types, Timber floors, floors (with beams, ribbed or flat) floor finishes, criteria for selection.

5. Roofs :
    Pitched roofs, types of trusses for different spans, types of roof coverings, rain water drainage and water proofing. Parapet, RCC modern roofs like shells, folded plates etc.

6. Staircase :
    Size, location and layout, Types, design considerations.

7. Concrete :
    Standard concrete mixes, batching and mixing, concrete mixers, placing and vibration, curing, Joints - construction, expansion and contraction placing concrete under water. Precast concrete, advantages, trasportation problems. light weight concrete.

8. Forms for Concrete Structure :
    Requirement of forms, material type, safety consideration, form work for modern shell roof, sliding form work.

TERM WORK

(a) The term work will consist of the following laboratory work with at least eight experiments.
    1. Test on aggregate
    2. Test on sand
    3. Test on cement
    4. Tests on concrete cubes
    5. Test on brick/timber
(b) Assignments based on above syllabus.

ORAL
Based on the above syllabus.

SUGGESTED REFERENCES

1. Building construction by S. C. Rangawala
2. Building construction by Sushil Kumar
3. Building construction by Dr. B. C. Punmia.
4. Building Construction by Y. S. Sane
5. Building Construction by N.K.R. Murthy

BUILDING DRAWING - I

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
1	—	6	4 hrs	100	25	25	25	175

1. **Introduction :**

   a) General information about building planning and building drawings.

   b) Role of owner, architect, engineer, contractor and sanctioning authority.

   c) Building rules and bye-Laws (as per IS : 1256)

   d) Study of code of practice for architectural drawing (as per IS : 962)

   e) Principles of planning, aspect, prospect orientation etc.

   f) Architectural consideration (massing, composition etc)

2. **Planning, Design and Drawing :**

   a) Information and data required for planning & designing.

   b) Different drawings, methods of drawing, scales etc.

   c) Planning and preparation of working drawings for simple residential buildings.

3. **Study of constructional details of**

   a) Doors b) Windows c) Roof trusses

   d) Floors e) Staircase etc.

TERM WORK

1. Complete set of working drawing for a residential building (bunglow type) with sloping tiled roof, and of load bearing structure (2 drawing sheets).

2. Complete set of working drawing for a residential building of framed structure of at least ground + one floor (2 drawing sheets)

3. Sketch book containing at least 15 sketches of various components of residential building.

Practical Examination

will consist of sketching of various component of residential building.

Oral Examination

will be based on the term work and above syllabus

SUGGESTED REFERENCES

1. Building drawing by Shah, Patki and Kale.

2. Building planning and designing by Y. S. Sane.

T. E. CIVIL SEMESTER V

STRUCTURAL ANALYSIS - I

Scheme of Instruction				Scheme of Examination				
Periods per week			Duration of theory exam in hrs.			Marks		
L	T	P		Theory	Practical	T. W.	Oral	Total
4	2	3	3	100	—	25	—	125

1. General Theorem : Theorem relating to elastic structures, Principle of vitual work, Strain energy in elastic structues, Mohr's theorems, Castigliano's theorems, Maxwell's law and Betti's theorem.

2. Deflection of Structures : Deflection of beams with variable cross section, deflections by application of Castigliano's theorems, deflection of simple pin jointed trusses by unit load method and graphical method using Williot-Mohr diagrams, deflection caused by temperature changes.

3. Influence lines for statically determinate structures : Influence lines for cantilever, simply supported beams, pin jointed trusses, criteria for maximum B. M. and maximum S. F. under rolling loads, absolute maximum B.M.

4. Struts : Struts subjected to eccentric and lateral loads, Design formulae for struts.

5. Eleastic Arches (Three hinged) : Determination of horizontal thrust, B.M., S.F. and axial thrust at any section of arch. Influence line for horizontal thrust, B.M. and S.F.

6. Suspension Bridges : Simple suspension cable, anchor cable, suspension bridge with three hinged stiffening girder. Influence line diagrams for horizontal reaction at cable support and B.M. and S.F. for any given section in stiffening girder.

7. Finding forces in pin jointed space frames : Vector methods and tension co-efficient method.

TERM WORK

Term work shall consist of at least 20 problems based on the above syllabus.

SUGGESTED REFERENCES

1. R.S. Khurmi " Theory of structures"
2. Timoshenko and Gere, "Mechanics of Materials".
3. Laursen, "Structural analysis".

GEOTECHNICAL ENGINEERING - I

Scheme of Instruction				Scheme of Examination			
Periods per week			Duration of theory exam in hrs.	Theory	Practical	T. W.	Oral	Total
L	T	P						
4	1	4	3	100	—	25	25	150

1. Introduction :
   Soil as an Engineering material;
   Soil Mechanics and the allied sciences;
   Nature of Problems in soil mechanics;

2. Properties of Soil :
   a) Physico-chemical properties of soils:
   Mineralogy of soils, Surface phenomena, Adsorption, Electrical properties of soil particles, swelling, Cohesion and Adhesion.

   b) Physical properties of soils : Soil as a three phase system, Mechanical composition, Soil structure, soil texture, porosity, void ratio, Density, Water content, Weight volume relationships.

3. Soil Moisture :
   Forms of soil moisture, hydroscopic, capillary and gravitational water. Expansion, shrinkage of soil masses. Effect of water on consistency. Consistency limits, Effective and neutral stresses.

4. Classification of Soils :
   Soil types and groups, systems of classification, shape and size of soil particles, Grain size distribution, Mechanical analysis, I.S.I. classification.

5. Flow through soils :
Darcy's Law, permeability and its measurements, Falling and constant head permeameters; Field determination of permeability, seepage through homogeneous soils, simple flow nets and their uses, Permeability of stratified masses of soil, Factors affecting permeability.

6. Compaction :
Definition, Theories of compaction, Mechanism of compaction, Proctor's test, Proctor density and optimum moisture content; Compaction control in field.

7. Consolidation :
Behaviour of soil under loading, compressibility and consolidation, One dimensional consolidation, Terzaghi's theory of consolidation, Estimation of settlement (amount and rate) on the basis of Laboratory results, Secondary consolidation.

8. Shearing strength of soils :
Coulomb's equation, concept of shearing strength, Principle stresses, Mohr's theory of rupture, Mohr envelopes, Measurement of shear strength by direct shear test, Triaxial shear test, vane shear test etc.

9. Earth Pressure :
Lateral earth pressure, Relation of deformation and Lateral pressure, "At Rest", Active and Passive conditions, conjugate stresses, Rankine's and Coulomb's theory of earth pressures.

10. Soil exploration and Sampling :
Purpose of soil investigations, soil survey, sampling methods, Disturbed and undisturbed sampling, Geophysical method, Bore logging.

TERM WORK

Term work shall consist of laboratory work on above topics and preparation of journal.

ORAL

The oral examination will be based on the term work.

SUGGESTED REFERENCES

1. Punmia B. C. "Soil Mechanics and Foundation"
2. Sehagal, S. B. "A text book of Soil Mechanics".
3. Alam Singh, "Modern Geotechnical Engineering"
4. I. S. I. Codes.

HYDRAULICS - III

Scheme of Instruction				Scheme of Examination				
Periods per week			Duration of theory exam in hrs.	Theory	Prac-tical	Marks		
L	T	P				T. W.	Oral	Total
4	—	4	3	100	—	25	25	150

1. Applications of momentum equations on stationery and moving vanes, force analysis on bends and jet propolsion.

2. Turbines : impulse and reaction turbines - Pelton turbine, details of the elements of turbine - determination of major dimensions - horse power and efficiency calculations, losses in the turbines, Energy balance, Reaction turbines inward and outward flow, radial, axial and mixed flow, turbines, determination of major dimensions, horse-power and efficiency calculations, losses in the turbine and energy balance.

3. Dynamics of Similitude : Tests on models, scale effects, specific speed and its influence on the shape of the runner.

4. Cavitation : Mechanism of cavitation, different types of cavitation - Thoma cavitation parameter and its relation with specific speed.

5. Governing of Turbines : Methods employed in Pelton, Francis and Kaplan turbines - characteristics of turbines.

6. Pumps : Centrifugal pumps, Types of energy recovery devices - working - head and efficiencies, minimum starting speed, design of impeller and pipes, specific speed, multi-stage pumps - pumps in series and parallel, performance characteristics. Reciprocating pumps - effect of accelaration and friction of liquids in the suction and delivery pipes - application of air vessels and their advantages.

7. Miscellaneous Hydraulic Machines : Hydraulic ram, jet pump, air lift pump and hydraulic accumulators.

TERM WORK

The term work shall include at least six experiments based on the above syllabus and six assignments.

The laboratory work as recorded in the journal along with the assignments shall be counted as term work.

ORAL

The oral examination will be based on the term work.

SUGGESTED REFERENCES

1. Dr. Modi and Seth "Hydraulics and Fluid Mechanics"
2. Dr. A. K. Jain "Fluid Mechanics and Machinery".

SURVEYING - III

Teaching Scheme/Week				Examination scheme				
L	T	P	Time	Theory	Pract	Oral	T. W.	Total
4	1	4	3 hrs	100	50	—	25	175

1. Tacheometric Surveying : General principles of Tacheometry and different types of tacheometers. Principles of stadia methods. Determination of instrument constants. Derivations of distance and elevation formulae for vertical and normal holding of the staff. Reduction of Tacheometric data. Use of tacheometric tables and other graphs.

2. Field Astronomy :

a) Basic formulae of spherical trignometry (without proof).

b) Definition of terms : Longitude, latitude, celestial sphere, Zenith, Nadir, Poles, Horizon, Equator, Altitude azimuth, Hour Angle, Declination, Right Ascension Equinoxes, Solstices, Meridian, Prime Vertical etc.

c) Different systems of coordinates for heavenly bodies, merits and demerits.

d) Different systems of time reconing. Conversion of one system to another. Equation of time.

e) Correction for refraction, parallax semidiameter, instrumental correction.

f) Determination of true meridian and azimuth General principles of determining latitude, hour angle etc by observing a star or sun with a theololite or sextant.

3. Photographic surveying : Salient features of photo theodolite. General Principle of ground and aerial photographic surveying. Determination of heights of objects from aerial photographs. Field work and mapping.

4. Hydrographic Surveying : Shore line survey, river survey, soundings, methods of locating soundings, Three point problem.

5. Geodetic Surveying : Definition and scope of Geodetic survey. Principles of triangulation and classification. Reconnaissance, choice of stations, intervisibility and height of stations. Signals - different types. Satellite station and reduction to centre, baseline measurement.
Introduction to Digital electronic instruments for measuring distances.

TERM WORK

The term work shall consists of :

1. Drawing of contour survey with fixed stadia method of tacheometry on full imperial sheet.

2. Assignments problems on the above topics.

SUGGESTED REFERENCES

1. Surveying and Levelling Part -II, by T. P. Kanetkar and S. K. Kulkarni.

2. Surveying Vol, II and III, by Dr. B. C. Punmia.

Practical Examination

The practical Examination shall be based on the above syllabus & field work.

PROJECT MANAGEMENT

Scheme of Instruction Periods per week				Scheme of Examination Marks			
L	T	P	Time	Theory	Pract/Oral	T. W.	Total
4	—	—	3 hrs	100	—	—	100

1 Basic concepts of management - Project management a new discipline systems technique in project management (with special reference to construction projects).

2. Network system in construction planning - CPM and PERT-Fundamentals of Network Analysis - Basic definition - Activity identification - Network construction - Network planning - Network analysis - Crashing.

3. Economic of Engineering projects - Factors in economic evaluation - Time value of maney - useful life - Capital and depreciation. Annual cost analysis - total cost analysis - Minimum cost analysis.

4. Profit planning and fore casting : Demand analysis and fore casting - Regression and least square methods - Break-even analysis - make or buy decisions - choosing factor mix equipment selection - improving profit performance.

5. Project design : Planning and allocation of resources - project time - productivity - Inventory planning and control - optimization in inventory models - EOQ and ABC classifications - cash balance and replacement models.

6. Apprising project feasibility :

a) Evaluation of capital - pay back ARR - TRR - NPV and DCF-Multiple rates of return and capital rationing.

b) Input - output Analysis - Measurement and analysis of risk-simulation - Regression and input - output analysis.

SUGGESTED REFERENCES

1. Quanti techniques for Business decisions — by R. D. Johnson and B. R. Seskin.

2. Managerial Economics Theory and application for decision making — by L.C. Peppers and D. G. Bails.

3. Organisational planning and management development — by N. V. Terry and EFC Brech.

4. Principles of Management Accounting — by Man Mohan and S. N. Goyal.

5. Economic of Engg. Works — by R. C. Singh.

6. C. P. M. Analysis — by L. I. Srinath.

7. Optimisation theory and application — by S. S. Rao

8. Fundamentals of Financial management — by Van Horne.

9. PERT & CPM analysis. — by Punmia & Khando & Khaudorial

BUILDING DRAWING II

Sceme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory.	Pract.	T.W.	Oral	Total
4	1	—	4 hrs	100	—	50	25	175

Chapter -1 Design considerations of public buildings - factors influencing design - principles, location, components. human factors, capacities, orientation, horizontal and vertical circulation, architecture, regulationS and bye laws.

Chapter -2 Design and drawing of the following public buildings (preliminary design only) - Educational, commercial, industrial, entertainment and recreation, offices-hotels.

Chapter -3 Perspective drawing - principles, regulations, types, advantages, methods.

Chapter -4 Planning layouts - General study of principles of town planning, master plans, layouts and general design principles of planning of layouts, use of modular co-ordination- aims and objectives.

TERM WORK

1. The term work shall consist of at least five sheets (3 sheets on public buildings, 1 sheet on perspective drawing and 1 sheet on layout for a town).

2. Visits to typical public buildings (at least three) and accompained by a report on the visits consisting of the design principles observed.

ORAL
Oral Examination will be based on the above syllabus.

SUGGESTED REFERENCES
1. Human Factors Design Engg. — by Woodson MGH.
2. Archiectural Time Savers Series - & Standards — TMGH

3. Building Drawing — Y.S. Sane

4. Sun, Wind & Light Archetectural Design Strategies — by G.Z. Brown, John Witey & Sons Newyork

5. Perspective Drawing - Holmes. TMGH.

6. Building Drawing — Shah, Kale & Patki.

T. E. CIVIL SEMESTER VI

STRUCTURAL ANALYSIS - II

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	1	3	3 hrs	100	—	25	25	150

1. General : Distinction between determinate and indeterminate structures, static and kinematic indeterminacy of structures, stable and unstable structures.

2. Analysis of Indeterminate Structures :

a) Force Methods : Clapeyron's theorem of three moments, methods of consistant deformations and Castigliano's theorem of least work. Applications to continuous beams, single storey portal frames with sway, simple pin jointed trusses.

b) Displacement Methods : Slope deflection method and moment distribution method. Applications to continuous beams, single storey portal frames with sway.

c) Stiffness and flexibility coefficients : use of stiffness and flexibility coefficients in the formulation of equilibrium and

compatibility conditions respectively. Stiffness and flexibility matrices for some simple cases.

3. Plastic analysis of steel structures : Stress Strain characteristics of mild steel, Factors of safety, Load factor, Shape factor, plastic modulus, plastic hinge, collapse load, General principles of plastic analysis, Applications to propped beams, fixed beams and continuous beams.

TERM WORK

Term work will consist of at least 20 problems based on the above syllabus.

ORAL

Oral Examination will be based on the Term work.

SUGGESTED REFERENCES

1. Wang, C. K. "Statically Indeterminate Structures"

2. Laursen, "Structural Analysis".

3. Dayaratnam, P. "Analysis of statically Indeterminate Structures".

4. Arya and Jain, "Theory and Analysis of Structures".

5. J. S. Kinney, "Indeterminate Structural Analysis".

6. K. H. Gerstle, "Analytical Methods in Structural Analysis".

7. Thadani, B. N. "Modern Methods in Structural Mechanics".

8. Neal, B. G. "Plastic Methods of Steel Structures".

9. Arya and Ajmani "Design of Steel Structures".

GEOTECHNICAL ENGINEERING - II

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	1	2	3 hrs	100	—	25	25	150

1 Stress Distribution in Soils: Introduction, Boussines of Equation Line load, strip load circular area, Pr. distribution, Newmark's influence chart, Westergaard's analysis - basic concepts.

2. Settlement Computation : Types of settlement , computations based on theory and test results, Effect of width and depth of foundation, construction time settlement, Permissible settlements as per I.S.I.

3. Bearing Capacity : Definition, Terzaghi's theory, General shear and local shear, factors influencing bearing capacity, Introduction to Meyerhof's theory, use of plate load test, SPT in assessing bearing capacity.

4. Shallow foundation : Types of foundation, Minimum depth of foundation, spread footing, combined footing and raft footing. Design of isolated footing, Basic principles of design of raft and combined footing, ISI code of practice for design of raft foundation, Contact pressure.

5. Pile Foundation : Types of piles, Load bearing capacity, Static and Dynamic formulae, Pile load test, Principles of Design of pile foundation, Group action in piles, Negative Skin friction Methods of construction, Elements of action of laterally loaded piles, under-reamed pile etc.

6. Machine Foundation : Mass-spring system, Forced vibrations- undamped and damped, Natural frequency of foundation - Soil system, Resonance - Barken's method, Dynamic elastic constants. Requirements of design of foundations for different types of machines. I.S.I. code of practice.

TERM WORK

Term work shall consist of assignments based on above syllabus.

ORAL

The oral examination will be based on the term work.

SUGGESTED REFERENCES

1. Punmia, B. C. "Soil Mechanics and Foundation".
2. Kasmalkar "Foundation Engineering"
3. Brahma, S. P., "Foundation Engineering".
4. Nayak, N. V., "Foundation Engineering Hand Book".
5. ISI Codes.

STRUCTURAL DESIGN IN STEEL

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	1	3	3 hrs	100	25	25	25	175

1 Introduction : Properties of Indian Standard Rolled Steel Sections, Types of structural steel, Types of loads, Types of connections, use of rivets, bolts and welding.

2. Rivetted connections : Types of joints, failure of a joint axially and eccentrically loaded rivetted joints, simple connections of beam to beam and beam to column. Design to stiffened and unstiffened seat connections.

3. Welded connection : Types of welds, design of fillet welds, axially and eccentrically loaded joints, unstiffened and stiffened seat connections.

4. Design of Tension Members : Introduction, Net sectional area, Permissible stresses, axially loaded tension members, lug angle.

5. Design of compression members : Introduction, slenderness ratio, permissible stresses, design of angle struts, axially loaded compression members, design of built up sections with lacings and battens.

6. Design of beams : Introduction, lateral stability of beams with unrestrained compression flanges, rolled and built up sections, design of rivetted and welded plate girders.

7. Roof Trusses : Introduction, components of a roof truss, roof coverings, loads on roof, design of purlins, design of members, joints and end bearings.

8. Column Bases : Design of slab base, gussetted base and grillage foundations for axially loaded columns.

TERM WORK

The term work will consist of :

1. A set of at least 8 problems with sketches based on the above syllabus and

2. A design report and two imperial size drawing sheets on projects covering the above syllabus.

The drawing will be in pencil only.

ORAL

There will be a oral examination based on above syllabus.

PRACTICAL EXAMINATION

There will be a practical examination of Half an hour duration before the oral examination. The practical examination will involve sketching of detail based on the above syllabus.

SUGGESTED REFERENCES

1. Arya and Ajmani, "Design of steel structures".

2. Kazini and Zindal, "Design of steel structures.

3. Ramachandra, "Design of steel structures" Vol. I and II.

4. I.S. 800.

5. Design of steel structures — S.K. Duggal.

TRANSPORTATION ENGINEERING

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	1	2	3 hrs	100	—	25	25	150

1 Introduction : Scope, importance and Development of transportation engineering, Alignment for roads/railways.

2. Highway Engineering :

1. Definition and classification of roads.

2. Geometirc Design : Cross sectional elements, sight distance, superelevation, horizontal and vertical alignments.

3. Pavements : Types, components, methods of design, wheel load, Design of flexible pavements, G. I. and CBR method.

4. Traffic Engineering : Scope, Traffic characteristics, Traffic volume studies, speed studies, O and D study Traffic flow characteristics, capacity study, parking and accident study, Road signs, signals, marking and lighting, Traffic intersections, rotary and channelizing islands, Grade seperation.

5. construction and maintenance : Materials of construction, desirable properties, Gravel roads, W.B.M. roads, Bituminous pavements, Cement concrete pavements, joints in C.C. pavements, Pavements failures, maintenance.

6. Drainage : Importance, surface and subsurface drainage, road construction in water logged areas.

3. Bridge Engineering : Types of bridges, selection of bridge site, Discharge calculations, Linear water way, Economic span, Clearence, Afflux, Depth of Scour.

4. Railway Engineering : Gauges, Geometric design, Permanent way and its components, Rails, Ballast, Sleepers, Location and layout of stations, Points and crossings, construction of permanent ways, Principles of signalling and interlocking.

5. Air Port Engineering :

1. General : Selection of site, Airport terminology, Classification of airport, factors controlling construction of airport.

2. Runway : Alignment, wind Rose diagrams, Basic runway length and corrections, geometric design and configurations, capacity, LCN.

3. Taxiway : Factors controlling layout, geometric design standards.

4. Terminal area and airport layout various area Apron, typical layouts. Airport marking and lighting.

TERM WORK

The term work will be based on laboratory course in highway engineering (minimum six experiments) and assignments.

ORAL

Oral Examination shall be based on the term work.

SUGGESTED REFERENCES

1. Highway Engineering by Khanna and Justa.
2. Bridge Engineering by D. R. Phatak.
3. Railway Engineering by M. M. Agarwal.
4. Airport Planning and Design by Khanna and Arora.
5. IRC/ISI codes.

QUANTITY SURVEYING AND COSTING

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
1	1	4	3 hrs	100	25	25	25	175

Chapter -1 Estimates : types, methods, units of measurements, nomenclature of items, Estimation of buildings, sanitary and water supply works, Roads, irrigation works, culverts, bridges.

Chapter -2 Analysis of rates - analysis of rates of buildings, sanitary and water supply works, roads works.

Chapter -3 Specifications - Types - study of detailed specifications of buildings, roads.

Chapter -4 Valuation, P.W.D. accounts and procedure of works.

Chapter -5 Schedule of rates - methods of preparation - use in abstracting and billing.

TERM WORK

1. The term work shall consists of estimation at least 6 problems covering building, sanitary and water supply works roads, irrigation works, culverts and bridges.

2. Study of existing plan of a building and preparation of report consisting of estimate, valuation and other aspects desired by the teacher incharge of the subject.

PRACTICAL/ORAL

The Oral & Practical Examinations shall be based on the above term work.

SUGGESTED REFERENCES

1. Estimating & Costing — by Chakraborty
2. Estimating and Costing — Datta.
3. Civil Engineering Contracts and Estimates — by B.S. Patil.
4. Estimating and Costing — by Rangwalla .

STRUCTURAL DESIGN IN CONCRETE

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	1	4	3 hrs	100	—	50	25	175

1 Concrete : Tests for aggregates, strength, workability and durability of concrete, grades of concrete, acceptance criteria for concrete, concrete mix design, I.S. code method.

2. Reinforced Concrete fundamentals : Concept of reinforced concrete, stress strain characteristics of concrete and steel, Basic elastic theory relating to singly reinforced sections - balanced, under reinforced and over reinforced sections, shear and bond stresses; Analysis of singly reinforced, doubly reinforced, rectangular and T sections.

3. R. C. Design : Working Stress Method : Design of oneway and two way slabs, simply supported, cantilever and continuous. Design of beams - simply supported, cantilever and continuous. - rectangular and T sections. Design of axially loaded columns.

4. Limit state method of design : as per IS:456 - 1978; concepts of probability and reliability, characteristic strength, characteristics loads; partial safety factors for materials and loads. Limit states of collapse - flexure, direct compression, shear, torsion and limit states of serviceability - deflection and cracking.
Design of singly and doubly reinforced rectangular and T sections for flexure and shear, axially loaded columns.

5. Pre-Stressed Concrete : Principles of prestressed concrete, materials used and their properties; methods and systems of pre stressing; losses in pre stress; Analysis of sections subjected to pre stress and bending moment.

TERM WORK

Term work will consist of at least 20 problems based on the above syllabus with neat sketches wherever necessary.

ORAL

Oral Examination will be based on the Term Work.

SUGGESTED REFERENCES

1. Neville, A. M. "Properties of Concrete"

2. Krishnaraju, "Design of Concrete Mixes".

3. SPI 23 (S&T) - 1982 - I.S.I. "Hand book on concrete mixes".

4. Mallick and Gupta, "R. C. Design".

5. Sushil Kumar, "Treasure of R.C. Design".

6. IS 456-1978, "Code of practice for plain and reinforced Concrete".

7. Hughes, "Limit State Theory for R.C. Design".

8. Jain, A.K., "Limit State Method".

9. Krishnaraju, N. "Pre Stressed Concrete".

10. Mallick and Rangasamy, "Pre Stressed Concrete Design".

11. I.S. 1343 - 1981, "Code of practice for pre stresses Concrete".

B. E. CIVIL SEMESTER VII

STRUCTURAL DESIGN AND DRAWING IN CONCRETE

Scheme of Instruction Periods per week					Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	—	5	4 hrs	100	—	50	25	175

Note : Relevant I.S. Codes (latest) to be followed.

1 Foundations : Isolated, square and rectangular footings; Combined footings, raft foundation.

2. Buildings : Complete design of a residential, Office or industrial building including stair case.

3. Retaining Walls : Cantilever, counterfort and buttress type.

4. Water Tanks : at ground level, under ground type and over head type including supporting structure - Intze type water tank.

5. Pre stressed concrete beams : Complete design of a simply supported post tensioned pre stressed concrete beam.

TERM WORK

Each candidate shall submit a design report and atleast five imperial size drawing sheets of projects covering the above syllabus. One of these drawing sheets should be on pre-stressed concrete.

All the drawing work must be done in pencil only. There will be sketching examination of 30 minutes duration and will be generally based on the term work submitted.

ORAL

Oral Examination will be based on the Term Work.

SUGGESTED REFERENCES

1. John, A. Barker, "Reinforced Concrete Detailing".
2. Karve and Shah, "Illustrated Design of R. C. Buildings".
3. Jain and Jaikrishna, "Plain and Reinforced Concrete" Vol. I & II
4. Reynolds and Steedman "R.C. Designer's hand book".
5. Lin, T. Y "Design of Pre stressed concrete structures"
6. Leonhardt, "Pre stressed concrete Design and Construction".

IRRIGATION ENGINEERING

Scheme of Instruction Periods per week			Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	—	3 hrs	100	—	50	—	150

1. Introduction : Necessity, History of irrigation in India Different methods of irrigation. Principles of planning and operation of multi purpose projects, phases of development - and cost benefit ratio.

2. Water Requirements of Crops : Duty and delta - base period of crops - Factors affecting duty - Methods of improving duty, Crop seasons in India.

3. Basic Hydrology : Hydrological cycle, precipitation, Rainfall, Measurements of rainfall, Runoff - Factors affecting runoff- Catchments classification, Flood estimation - Hydrographs Unit hydrograph.

4. Ground water : Deep and shallow wells - Tube wells - Design of Tube wells, construction of tubewells - Methods of drilling - Development of tubewells - Types of aquifers, storage - coefficient specific capacity - yield.

5. Storage Reservoirs : Physical characteristics of reservoirs selection of distribution reservoir capacity for a given yiels- mass curve - Reservoir reliability - Reservoir sedimentation- control - Reservoir leakage - ideal site for reservoir.

6. Dams : Types of dams - selection of types of dams - Forces on dams Single step design of gravity dams - Construction features - Elementary principles design of arch and buttress dams - Their suitability - Methods of construction of Earth and Rockfill dams - Elementary principles of design of earth dam. Failure of earth dam.

7. Surplus works : Different types of spillways - suitabililty of various types - Energy dissipation works-Different types of crest gates - Outlet work - Scour protection below spillways.

8. Diversion Head Work : Component parts - River Weirs, Causes of failures - Remedise - Bligh's and Khosla's theory- Design of vertifical drop weir and u/s and d/s aprons and exit gradients - Methods of construction, divide wall, fish ladder, undersluices, cannal head regulator - Design - Location of head works - Effect of construction of weir on regime of river.

9. Distribution system : Canals, classification, alignment, losses. Design Kennedy's and Lacey's theory - use of Carret's diagram in the design of canals-lining of canals Inunidation canals Bhandara Irrigation - Use of appropriate technology.

10 Canal Regulation works : Types of falls - Design of sarda type falls - Distributory and Head regulators - escapes - principle of design.

11. Cross Drainage works : Necessity, Design principles of Aqueducts, siphon aqueducts, superpassages - level crossings - site selection.

12. Water Logging and Control : Causes and effects of water logging antiwater logging - Methods of drainage and reclamation of water logged areas and alkaline soils.

TERM WORK

. Each candidates shall submit a journal containing solution to a set of six assignments based on the above syllabus.

SUGGESTED REFERENCES

1. Irrigation Enginneing by Khushlani K. B.
2. Theory and Design of Irrigation Structures by Varshney and Gupts.
3. Irrigation Engineering by Punmia, Pande and Lall.
4. CBIP and ISI codes.

CIVIL ENGINEERING PROJECT

	Scheme of Instruction Periods per week			Scheme of Examination Marks		
	L	T	P	T.W.	Oral.	Total
Sem VII	---	---	5	---	50	50
Sem VIII	---	---	15	50	50	100

50

The project may be on any topic of Civil Engineering except topic selected by the candidate for the project under elective. The project may consist of :

a) Design of simple Civil engineering projects and preparing working drawings/reports.

OR

b) A repot on investigation work / analytical work / case study etc.

TERM WORK

The term work be based on above syllabus and shall be in the form of a report.

ORAL

The oral shall be based only on preliminary work in Sem. VII and on Term work in Sem. VIII.

GEOTECHNICAL ENGINEERING - III

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	—	3	3 hrs	100	—	25	25	150

1. Stability of Slopes : Introduction, Stability analysis of infinite and finite slopes, Swedish circle method, method of slices, friction circle method, Stability of slopes of earth dam under steady seepage and sudden draw down condition, Taylor's stability No.

2. Caissons and Confferdams : Types, Bearing capacity, Forces acting, Well foundations components, depth, design and well sinking. Pneumatic caisson and Drilled caisson.
Types of cofferdams, Design requirements.

3. Ground Improvement : concept, Ground improvement techniques, Introduction to Soil stabilization - mechanical, additives, compaction, vertical sand drain, stone columns, Reinforced earth, Geosynthetics, lime pile etc.

4. Underpining : Concept, Reasons for underpinning, Different methods.

5. Soil Structure Interaction : Concept, Effect of interaction on design of structures and shallow foundations.

6. Earthquakes : Effects on soil foundation system, Earthquake coefficients.

7. Foundation problems in expansive soils, Floating foundation.

TERM WORK

The term work shall consist of assignments based on the syllabus.

ORAL

The oral should be based on above term work.

SUGGESTED REFERENCES

1. Foundation Engineering Hand book - winterkorn and Fag
2. Hand book of Foundation Engineering - Kaniraj.
3. Foundation Engineering - Brahma.

ENVIRONMENTAL ENGINEERING

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	1	3	3 hrs	100	—	50	25	175

Part - I Introduction to Environmental Engineering.

Chapter-1 Environment, human - environment interactions, the role of environmental engineer in the improvement of water quality and utilization.

Part - II Water

Chapter-2 Quantity of Water : Forecasting of population, water demand, typical flow sheets for quantitative aspects, design periods, sources of water supply.

Chapter-3 Quality of Water : Definitions, characteristics and perspectives :

a) Physical water quality parameters - suspended solids, turbidity, colour, taste, odour and temperature.

b) Chemical water quality parameters - pH, Alkalinity, hardness, halides, organics and nutrients, significance of dissolved oxygen.

c) Biological water quality parameters - Microbes in natural water systems, salient features of selected bacterial groups and their estimation. Pathogens and pathogen indicators.

Chapter-4 Water Purification Process

a) Aeration : Theory and application, types of aerators, removal of iron and manganese.

b) Solids separation : Theory and applications, ideal settling basin, design of sedementation tanks, clarifers, tube settlers settling column analysis.

c) coagulation : Theory of coagulation and flocculation, coagulents and their properties jar test, mixing devices and their design.

d) Softening : Causes of hardness, methods of softening, softening operations.

e) Filtration : Theory of filtration, filter hydraulics, filter components, filter operations, operational problems, design of filters.

f) Disinfaction : General methods of disinfactions, chlorination properties of chlorine, action of chlorine, forms of chlorination application of chlorine, tests for chlorine.

Chapter-5 Distribution system for water

General considerations, methods of distribution, service reservoirs, design considerations of distribution systems.

Part - III Waste Water

Chapter-6 Quantity and Collection of waste water : Estimation DWF, WWF, types of collection systems, type of sewers, design construction and maintenance of sewers.

Chapter-7 Waste Water Quality : Waste water characteristics physical, Chemical and biological characteristics.

Chapter-8 Methods of sewage Disposal : Dilution - self purification of natural waters, dissolved oxygen balnace, organic discharge and stream ecology, land disposal

Chapter-9 Principles and Concepts : Solids separation, density separation, aeration, flotation, - Biological principles - bacterial growth pattern, aerobic and anerobic decomposition - typical flow sheets.

Chapter-10 Waste Water Treatment : Theory, principles, design and operation of the following :

a) Primary treatment; screens, grit chambers, primary sedimentation tank

b) Secondary treatment : Suspended culture systems - activated sludge, oxidation ponds lagoons, oxidation ditch. Attached culture systems - trickling filter, rotating biological contractors, secondary clarification.

c) Sludge treatment and disposal : Sludge characteristics, sludge thickening, sludge digestion, sludge disposal.

Chapter-11 Miscellenious Methods of Sewage Treatment : Septic tanks, imhoff tanks, cesspools, aquaprives,

Chapter-12 Effluent Disposal and Reuse

Chapter-13 Pumps and Sewer Apurtenances

TERM WORK

1. The term work shall consist of atleast 10 laboratory experiments pertaining to water and waste water analysis.

2. Preparation of report based on the visits to water treatment and sewage treatment plants.

ORAL EXAMINATION
The oral examination shall be based on the syllabus and laboratory work.

SUGGESTED REFERENCES

1. Water Supply and Sewerage by E.W. Steel

2. Water and Waste-water Technology by Mark J. Hammer

3. Physicochemical processes for Water Quality Control by Weber.

4. Environmental Engineering by H.S. Peavy & Donal R. Rowe

5. Waste-water Engineering by Metcalf & Eddy.

6. Water and Waste-water Engineering Vol-I & II by Fair, Gayer and Occum.

CIVIL ENGINEERING SYSTEMS
(Elective - I)

Scheme of Instruction Periods per week			Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	25	50	175

1. Concept of system analysis with reference to Civil Engineering structures.

2. Numerical and Matrix methods. Stiffness and Flexibility matrices. Application to soil as elastic half space and foundation as thin plate.

3. FEM : Introduction. Steps involved in the use of FEM for system analysis. Beam elements to represent super structure members. Truss elements. CST elements. Assembly, simple solution techniques. Sub structuring.

4. Time effects : Time as additional dimension in system analysis. Application to consolidation under rigid footings.

5. Necessity of system analysis and descriptive study of effects on design of components.

6. Introduction to techniques of economising computer memory.

7. Introduction to dynamic systems. Linear and dynamic programming. Simulation techniques, application to Civil engineering problems.

TERM WORK

The term work shall consist of atleast 6 assignments based on the syllabus.

ORAL

Oral examination will be based on the term work and relevant background of the above syllabus.

SUGGESTED REFERENCES

1. Introduction to the FEM - C. S. Dessai and J. F. Abel.

2. Foundation analysis and Design - Dewles.

3. Relevant Seminar/Conference volumes.

4. "Numerical Methods in Science and Engineering", S. Rajasekaran.

5. "Numerical Methods in Finite Element Analysis" — K.J. Bathe, and E.L. Wilson.

ADVANCED STRUCTURAL ANALYSIS
(Elective - I)

Scheme of Instruction Periods per week			Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	25	50	175

1. Stiffness Method :
   1. Stiffness method in Matrix form :
      Review of concept of stiffness coefficient, Stiffness matrix of elastic spring, truss, beam and grid elements. Properties of stiffness matrix, stiffness matrix in local co-ordinates. Transformation matrix. Stiffness matrix in global co-ordinates. Assemblages of structure stiffness matrix. Equilibrium conditions. Introduction of boundary conditions. Method of solution for displacements. Computation of internal forces in members. Application of stiffness method to beams, pin jointed and rigid jointed plane frames and grids.

   2. Conventional forms of the stiffness method :
      Application of slope deflection and moment distribution methods to frames involving sway; consideration of symmetry and anti symmetry in the application of these methods. Modified moment distribution method. Kani's method. Applications to beams and frames.

2. Flexibility Method :

   2.1. Flexibility method in matrix form :
      Review of the concept of flexibility co-efficients selection of primary structure. Member flexibility matrix, transformation matrix, structure flexibility matrix. Compatibility condition. Solution for redantants and computation of internal forces and joint displacement.

   2.2 Conventional forms of flexibility method :
      Coloum Analogy and Elastic Centre methods - applications to beams and simple frames.

3. Comparison of stiffness and Flexibility methods.
   Introduction to Finite Element method.

4. Computer Programmes :
   Analysis of simple beams and frames using computer programmes based on matrix stiffness & flexibility methods.

5. Influence lines for indeterminate structures :
   By Muller Breslau Principle. Influence lines by Moment distribution method - application to beams and single storey portal frames.

TERM WORK

Term work will consist of solution to at least 20 problems based on the above syllabus.

ORAL

Oral Examination will be based on the term work.

SUGGESTED REFERENCES

1. Laursen, H. I. "Structural Analysis".
2. Ghali, A. and Neville, A.M. "Structural Analysis".
3. Gere, J. M. and Weaver, W. "Analysis of Framed Structures".
4. Manickaselvam, "Modern Methods of Structural Analysis".
5. Raz, S. A. "Analytical Methods in Structural Analysis".
6. Krishnamoorthy, C. S. "Finite Element Analysis".
7. Manickaselvan, "Rudiments of Finite Element Methods".
8. V. James Mayers, "Matrix analysis of Structures".

ADVANCED HIGHWAY ENGINEERING
(Elective - I)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	25	50	175

1. Highway Administration : Development of Highways in India Central and State administration, the role of I.R.C.

2. Highway Economics and Financing : Benefits of highway improvement Vehicle operation cost of highway improvement, Highway economic analysis - Annual Cost method, rate of return method, Benefit cost ratio method, Highway Financing - responsibility and method of highway financing Central road fund.

3. Highway Palnning in India : The Nagpur plan and other plans, High-way classification.

4. Geometric Design of Highways - Highway capacity, Design & Design speed, sight distances, Design of a verticle Horizontal alignments, super elevation, extra widening at curves, Cross section of highways.

5. Traffic Engineering : Traffic studies - Volume, speed origin and Destination, Date analysis, Accident Studies and analysis, Traffic signal channelization, Design of junctions.

6. Highways pavements : rigid and flexible pavements, components of a pavement; Factors affecting pavement performance, wheel loads, contact area and type inflation pressures. Wheel configurations, repetition of loads impact Equivalent wheel loads.
Flexible pavement design : Group Index method C.B.R. method and its variations, Moleod method U.S. Navy method Rigid pavement design - Stresses in concrete pavement. Westerguard solution, Temperature and warping stresses.

7. Soil Classification with special reference to highways - soil moisture, compaction and their application to highway construction C.B.R. test, Marshal stability test.

8. Special considerations in the construction of roads on clay soils, black cotton soils, Marshy lands, Hill roads.

TERM WORK

The term work shall consist of a project based on the above syllabus which may cover any of the following aspects.

a) Geometric designs for a new highway or improvement to existing facilities.

b) Traffic Studies-data collection, analysis and proposals for new facility or improvement to existing facility.

c) Pavement design complete with studies of subgrade, construction material design and specifications for material and construction.

d) Soil studies in any way associated with highway design construction.

e) Road project incorporating alignment, L section cross section C. D. etc. Works.

ORAL

The oral examination will be based on the above termwork.

SUGGESTED REFERENCES

1. Highway Engineering - Khanna and Justo.
2. IRC codes
3. Highway Engineering - R.C. Sharma and Sharma

AIR POLLUTION
(Elective-I)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	25	50	175

Chapter-1 Air Pollution Past, Present and Future
Global implications, units of measurement, sources of pollutions.

Chapter-2 Classification of Pollutants

Chapter-3 Meteorology and Natural Purification systems

a) Elemental properties of the atmosphere.

b) Influence of meteorological phenomena on air quality Dispersion versus Lapse rates, pressure systes, winds, moistures and related parameters. Plume dispersion and plume rise, modelling.

Chapter-4 Study of Pollutants
Sources - Inventeries, interactions and effect of the following :
a) Suspended particulate matter
b) Oxides of Nitrogen
c) Oxides of sulphur
d) Photochemical oxidents
e) Carbon monoxide
f) Toxic chemicals
g) Radiation.

Chapter-5 Global Pollutents : Carbon dioxide & ozone depletion
a) Green house effect and global warming.
b) ozone depletion.
c) international strategies to tackle global pollutants.

Chapter-6 Engineering systems for Air Pollution Control
Principles, design, operation and maintenance of the following devices : gravitational settings chambers, centrifugal collector, wet collectors, fabric filters, electrostatic precioitators, scrubbers, absorption towers adsorbers.

Chapter-7 Air Pollution and Legislation.

TERM WORK

The term work shall consists of atleast four assignments on any of the topics of the syllabus as approved by the teacher incharge or a laboratory course work consisting of at least 6 experiments.

ORAL

It will be based on the term-work.

SUGGESTED REFERENCES

1. Air Pollution by Perkins.

2. Air Pollution by Crofferol and Martin

3. Air Pollution by P.S. Rao

4. Environmental Engineering by Peavy.

APPLIED HYDROLOGY
(Elective - I)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	25	50	175

1. Hydrological Cycle - scope of hydrology.

2. Precipitation - Types - Measurement, rainfall records, missing data - Mass Curve analysis - Station Year method Depth area duration analysis.

3. Water losses : Evaporation, Interception, Transpiration and infiltration. Determination of water losses.

4. Streams flow : Factors affecting streamflow - Rainfall runoff relationship runoff estimate using infiltration index.

   Hydrograph - Characteristics - Base flow separation Estimation of runoff from hydrograph - Unit hydrograph - complex hydrograph-curve - synthetic hydrograph - Hydrograph for short term records - Derivation of unit hydrograph for ungauged area - different methods - Dimensionless unit hydrograph.

5. Floods : Estimation, Envelope curves flood frequency studies - Estimation of design flood.

6. Flood routing - Reservoir routing, channel routing - graphical methods.

7. Hydrological Forecasting : General operation of flood forecasting - forecasting methods adopted in India. Forecasting by unit hydrograph method.

8. Ground water hydrology : Distribution of ground water yield transmissibility - Darey's Law - Dupuit's theory of unconfined flow - steady flow towards fully penetrating wells, (confined and unconfined). Unstudy flow towards wells - Types curve method, Jacob's method. Use of well functions - Pumping tests for aquifer characteristics, Methods of ground water recharge.

TERM WORK

Each candidate shall submit a journal containing solutions to a set of atleast five assignments based on the above syllabus. The above work shall be counted as term work.

ORAL EXAMINATION

The oral examination will based on the above syllabus.

SUGGESTED REFERENCES

1. A text book of Hydrology - S. R. Reddy.
2. Engineering Hydrology - R. S. Varshney.

EXPERIMENTAL STRESS ANALYSIS
(Elective - I)

Scheme of Instruction Periods per week			Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs.	100	—	25	50	175

1. Design and conduct of an experiment : Experimental error, preparation of report.

2. Strain guages : Mechanical, optical and acoustic - description and operation. Electrical resistance strain gauges - gauge characteristics and types, circuiting, equipment for recording static and dynamic strains, reduction of strain gauge data. Load, pressure and Displacement transducers.

3. Model analysis : Direct and indirect models. Law of structural similitude, Choice of scales, model materials, limitations of modal studies, Buckingham Pi Theorem. Design direct and indirect models - Begg's deformator and applications.

4. Two dimensional photo-elasticity : Optical principles, stress optic law, methods of producing isoclinics and isochromatic methods of measuring fractional fringe orders, model materials, methods of separating principal stresses.

5. Photo elastic coating : Moire fringe and Brittle lacquer techniques.
   Introduction to stress freezing techniques.

TERM WORK

Term work will counsist of at least 10 assignments/experiments based on the above syllabus.

ORAL

Oral Examination will be based on the Term Wrok.

SUGGESTED REFERENCES

1. Dally and Riley "Experimental Stress Analysis".
2. Jesso P.H.T. and Harris, P.G. "Photo elasticity - Principles and Methods".
3. Perry, C.C. and Lissner, H. R. "The Strain Gauge Primer".
4. Stuart L. Mayer "Data Analysis for scientists and Engineers".
5. Dove, R. C. and Adams, P.H. "Experimental Stress analysis and motion measurement".

GROUND IMPROVEMENT TECHNIQUES
(Elective - I)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	25	50	175

1. Introduction : Concepts, different methods of ground improvement.

2. Stabilization : Mechanical stabilisation, Soil-cement mixtures, Soil-lime, Soil-asphalt mixtures, intrusion grouting.

3. compaction : Principles of compaction, Deep compaction by vibrofloation and electro osmosis.

4. Ground improvements by stone column and sand drains.

5. Grouting : Chemical grouting, grounting equipments, grout volumes and pressures, grouting methods.

6. Reinforced Earth : Use of geotextiles, geofabrics and geo grids for soil reinforcement and reinforced earth.

7. Drainage and Dewatering : control of ground water in excavations and selection of appropriate method - Equipments employed. Provision of drainage, Exclusion techniques including the diaphragm wall.

8. Black Cotton Soils : Stabilization of B.C. Soils and use of CNS layer.

TERM WORK

The term work shall consist of laboratory tests and assignments based on above syllabus.

ORAL

The oral examination will be based on the term work.

SUGGESTED REFERENCES

1. Bell, F.G., "Foundation Engineering in Difficult ground".
2. Winterkorn and Fang "Foundation engineering Handbook".
3. Nayak, N. V. "Foundation Design Manual".

LOW COST HOUSING
(Elective-I)

Scheme of Instruction Periods per week			Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	25	50	175

1. Requirements of Low Cost Housing : Quantitative requirements and Qualitative requirements - national and regional requirements in hot, humid and arid regions.

2. Materials : Use of locally available materials, Low cost materials for roofing, walling, doors, windows etc. Stabilised soil block. I.S. Code specifications. The concept of cheaper materials for better confort. Thermal and water resistant properties of raw and finished low cost products. Use of mine rejects and other rejects, stabilised soil blocks.

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3. Design concepts : Raw housing, community housing complexes. Advantages and disadvantages. New design concepts for housing - harmonising with the surroundings.

4. Introduction to work by national and international organisations dealing with low cost housing and by research organisations.

5. Construction techniques : Block making machines. Typical hand operated and power operated machines for soil and concrete blocks in national and international field. 'Do it yourself' techniques. concept of involvement of end users in construction.

6. Financial assistance/subsidies/loans for low cost housing.

TERM WORK

1. Report on existing low cost housing OR Design and estimate of a typical self contained low cost house.

2. Assignment (at least 5) based on the above syllabus, in addition to (1) above.

ORAL

Oral exmination will be based on the above term work and relevant background of the syllabus.

SUGGESTED REFERENCES

1. Relevent reports and conference/seminar volumes of CBRI/NBO etc.

2. Relevent I.S.I. Codes.

B. E. CIVIL SEMESTER VIII

C A D IN CIVIL ENGINEERING

Scheme of Instruction Periods per week				Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total	
4	1	6	3 hrs	100	—	50	25	175	

Introduction to Engineering Software. Review of Fortran 77 Secondary storage, sequential and direct access files, Alternate programming languages, Introduction to operating systems. Data base management for Engineering software. computer graphics Fundamentals of Graphics. Kernel system and its use in CAD

Introduction to knowledge Based Expert system and appli cations to Civil Engineering Design.

CAD application in building design and planning, construc tion managemnt, design and detailing of concrete and steel structures and foundations.

Computer aided design methods and applications, Iterative methods. Inateractive design.

TERM WORK

Term work will consists of atleast 10 exercises based on the above syllabus.

ORAL

Oral Examination will be based on the Term work.

SUGGESTED REFERENCES

Voisinet, "Introduction to CAD", McGraw Hill International.

Plastock, R.A. and Kalley, G. "Computer Graphics", Schaum series, 1987.

Donal, D. Voisnet, "Computer Aided Drafting and Design" McGraw Hill International, 1987.

Negroponte - Petrocelli, (Editor) : "computer Aids to Design and Architecture", 1975.

ADVANCED CONSTRUCTION

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
		5	3 hrs	100	—	50	25	175

1. Advanced Methods in Concreting : Pneumatic pump, guniting, Pump crete, Slipforms, Automatic Weight batching.

2. Prefabricated Construction :

3. Construction Equipments : Excavating equipments - power shovels. Trucks and wagons, Rubber tyres, Belt conveyer systems. Use of compressed air. Pumping equipment. Tractors and related equipment.

4. Construction of foundation in difficult Sobsoil conditions

   Raft foundation, Earth dam foundation, Arch dam foundation, Pile foundations - installation, latest development bored and drilled caissons, use of bentonite.

5. Break Waters : Defenitions, Types, Mound type, Rock and concrete verticle wall type, Jetty and Wharf construction, open and closed construction, bulk heads.

6. Construction of Bridge abutments, piers, wing walls, Bridge flooring, Factors affecting locating and selection of bridge and different methods of errection.

7. Tunnels:Types, selection & alignment. Construction of tunnels in rock, soft soils, shield method, drainage, ventilation, lining, various types of shuttering, laying concrete lining.

8. Construction planning : Preparation of construction schedule for simple jobs. Scheduling labour and equipment, Principle of job layout, construction cost control, cost records of material and labour, progress report.

TERM WORK

1. The term work shall consist of report on field visits to works connected with the contents of the syllabus.
2. Assignments based on the contents of the syllabus.

SUGGESTED REFERENCES

1. Peurifoy, R. L., "Construction planning equipment and methods".

2. Bindra, S. P., "Principles and practice of bridge engineering".

3. Jha, J. J. and Sinha, S. K. "Construction and Foundation Engineering".

4. Quinn, A. D., "Design and construction of Ports and Marin Structures".

5. R. Srinivasan "Harbour, Dock and Tunnel Engineering".

ELECTIVE - II

ROCK MECHANICS

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. Introduction : Definition, Scope, Applications.

2. Properties of Rock, Specific gravity, Porosity, Void index, Permeability, Uniaxial compressive strength, Indirect tensile strength, Shear strength.

3. Engineering classification of Intact rocks and Rock masses. Necessity, Aims ISRM and Deere and Miller classification system; RQD, CSIR and NGI classification systems of rock.

4. Stability of rock slopes : Different types of failures of rock slopes, methods of analysis, Limit equilibrium method, Slope design charts.

5. In-situ Tests : Necessity, Plate bearing test - Principles and Techniques, Shear and permeability tests.

6. Methods of improving properties of Rock masses pressure grouting, Rock reinforcement, cable anchorages.

TERM WORK

A set of assignment on the basis of above syllabus.

ORAL

The oral shall be based on above term work..

SUGGESTED REFERENCES

1. Introduction to Rock Machanics - Goodman.
2. Rock Mechanics - Jaegale.
3. Rock Mechanics - Jumikis.
4. I S I Codes
5. Hand Book of Rock Mechanics — Lama & Vutukuri

STRUCTURAL DYNAMICS
(Elective - II)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. Introduction : Static Vs Dynamic loads, different types of dynamic loads, dynamic response.

2. Single degree freedom system : Undamped system, free vibration, natural frequency and period of vibration. Forced vibration, Dynamic load factor, Generalised Linear system theory for various forcing functions, Duhamel's integral. Damped systems, viscous damping, free vibration, forced vibration, coulomb damping. Response to a pulsating force, response due to support motions.

3. Lumped Mass Multi Degree Systems : Coupled and uncoupled system. Direct determination of natural frequencies, characteristic shapes, orthogonality of normal modes, Stodolla Vianello procedures for determination of natural frequencies and charateristics shapes. Energy approach for determi-

nation of natural frequencies, Rayleigh's method of natural frequencies, Lagrangi's equation. Modal analysis of multidegree elastic systems. Application to multidegree rigid frames subjected to lateral loads.

4. Structures with Distributed Mass and Loads : single span prismatic beams, Normal modes of vibrations, beams with different support conditions. Response of single span prismatic beams subjected to concentrated and distributed loads.

5. Earthquake Analysis and Design : Brief introduction to cause and occurance of earthquake, intensity of earthquake, Richter scale measurement of earthquake acceleration, Siesmograph. Response of multi-degree systems to support motions, Response spectra. Earth-quake spectrum analysis of multistorey frames. Practical design for earth quake as per relevant I.S. Codes.

TERM WORK

Term work will consist of solution to atleast 20 problems based on the above syllabus.

ORAL

Oral examination will be based on the term work.

SUGGESTED REFERENCES

1. Biggs, J. M., "Introduction to Structural Dynamics".

2. Viegel, R. L., "Earthquake Engineering".

3. Blume, R. A. Newmark N. N., Corning, N. H., "Design of Multi storey Reinforced Concrete Building for Earthquake motion.

4. Hurty, W. C. and Rubinsten, M F., "Dynamics of Structures".

5. Timoshenko S. & Young, D., "Vibration problems in Engineering".

6. Manickaselvam, V. K. "Structural Dynamics".

INDUSTRIAL WASTE TREATMENT
(Elective - II)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. Introduction to Industrial Waste Treatment :

a) Historical analysis and Global comparisons.

b) Impacts of wastes on streams and waste water treatment plants.

c) Differences between industrial and municipal wastes.

d) Stream standards and Effluent standards.

2. Engineering aspects if Industrial Waste Treatment :

a) General elements and trends in wastewater treatment.

b) Computation of Organic waste loads on streams

i) Streeter - Phelps Equation - statement, application and problem solving.

ii) Methods of determining pollution load capacity of streams.

iii) Sampling techniques.

iv) Modelling and Forecasting of industrial water use and treatment practices.

3. Basic theories and Principles :

   a) Volume reduction

   b) Strength reduction

   c) Neutralization

   d) Equalization and proportioning

   e) combined treatment.

4. Sectoral studies of waste treatment in a few selected industries.

   Processes, waste water characteristics, effects, treatment and reuse of treated water for the following industries (with flow charts).

   a) Textiles

   b) Tanning

   c) Dairy

   d) Brewery, Distillery and Winery

   e) Cane Sugar

   f) Fertiliser

   g) Petrochemicals

TERM WORK

Term work shall consist of assignments based on above syllabus, detailed drawing of processes and treatment of waste water from any two industries (OR) laboratory analysis of industrial waste water (a minimum of eight experiments).

ORAL

The oral examination will be based on the term work.

SUGGESTED REFERENCE

1. Industrial Waste Treatment by Neumarrow.

2. Waste Water Treatment by Rao and Datta.

DESIGN OF HYDRAULIC STRUCTURES
(Elective - II)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. Design and Construction of Dam :

   a) Investigation of dam site, general scope and purpose, Engineering surveys, geological investigation, Hydrological investigation - Fixation of storage capacity - Reservoir operation - Reservoir losses - Sedimentation in reservoirs, control.

   b) Gravity Dams : Criteria for selection of dam site, construction materials, function, treatemnt, Joints and keys, water stops. Temperature control, Galleries, Instrumentation.

   c) Forces acting on dams, types of loads stability analysis methods, safety criteria, gravity analysis (zone analysis)

Design of overflow and non overflow section by single step method and multiple step method. Stress analysis and stress contours composite dams.

c) Arch and Buttress Dams : Types of buttress dams, provisions of spillway works, Design principles of arch dam - constant angle and constant radius types - Appurtenant works.

d) Earth and Rockfill Dams : Advantages and limitations, Foundation for earth dams, causes and failure of earth dams, design criteria, seepage line and its shape for different types, filter, upstream blankets stability analysis, swedish circle method with pore pressure, details of construction - maintenance. Rockfill Dams - different types stability analysis, advantage over other types.

2. a) Design of Spillways and Flood Control works : Factors affecting design of spillway work. Types of spillway, Design principles of Ogee spillway and Bucket type energy dissipator stilling basin design. Design of chute spillways siphon spillways and shaft spillways, Flood mitigation reservoirs.

b) Crest gates, types, advantages, choice, Design of radial gate.

c) Outlet works through dams, Intake structures.

3. Design of small bridge and culverts Data collection High flood discharge Linear water way - scour depth principle of hydraulic design causeways and box culverts.

4. River Training works : River pattern, regime flow, Guide Banks, Flood levels, Design of guide bunds, launching prom and spurs, Bridge piers.

Hydro Electric Development : Types of power plants principles of planning of Hydro electric project - choice of turbines, tail race channel penstocks intake structures forebay pressure shafts, surge tanks.

TERM WORK

To be based on the above theoretical course and at least five assignments have to be prepared.

ORAL

Oral examination will be based on the term work submitted.

SUGGESTED REFERENCES

1. Theory and Design of Irrigation Structures - Varshney and Gupta.

2. Engineering for Dams Vol. I to III - Creager, Justin, Hinds

3. CBIP and ISI Codes

4. Hydroelectric Hand Book - Guthrie Brown.

ADVANCED PRE-STRESSED CONCRETE
(Elective - II)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. Composite construction of Pre stressed and in-situ concrete. Composite structural members, types of composite construction, analysis of stresses, differential shrinkage, deflection of composite members, stresses at serviceability limit state, flexural and shear strength of composite sections, design of composite sections.

2. Statically Indeterminate Structures : Continuous beams, concordant cable, linear transformation. Design of single bay single storey portal frames.

3. Pre Stresses concrete pipes and tanks : Circular pre stressing, types of pre stressed concrete pipes, design of pipes, general features of pre stressed concrete tanks, analysis and design of tanks.

4. Pre stressed concrete Poles, Piles, Sleepers, Pressure vessels and Pavements : Design aspects of the above members.

5. Introduction to Optimum Design of Pre Stresses Concrete Structures : Principles and methods of optimisation, application to pre stresses concrete structures.

6. Stability Problems of pre stressed concrete members : Buckling of pre stressed concrete member, buckling of pre stressed concrete slabs, shells and plates, lateral instability of pre stresses beams.

7. Suggestions ragarding construction Procedure, Centering etc. Tendons, Centering, the concreting programme, concreting, pre stressing, supervision of the job, accident prevention.

TERM WORK

Term work will consist of atleast one assignment on each of the above chapters.

ORAL

Oral Examination will be based on the Term Work.

SUGGESTED REFERENCES

1. Leonhard, T. F., "Pre Stressed concrete - Design and Construction".

2. Krishnaraju, N., "Pre Stressed Concrete".

3. Mallick, S. K. and Gupta, A. P. "Pre Stressed Concrete".

4. Dayaratnam, P., "Pre Stressed Concrete Structures".

OFF-SHORE STRUCTURES
(Elective - II)

Scheme of Instruction Periods per week				Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. Random processes, waves and wave forces, fluid structure interaction, wind and wind loading, seismic forces.

2. Analysis of offshore structures, model analysis.

3. Foundation for off shore gravity structures, geotechnical aspects, soil structure interaction.

4. Codal provisions for the design of off shore structures.

5. Analysis and design of sub marine pipe lines.

6. Requirements of materials for off shore structures, sea bed survey for off shore structures, instrumentation systems for off shore gravity platforms.

TERM WORK

Term work will consist of atleast one assignment in each of the above topics.

ORAL

Oral examination will be based on the Term Work.

APPLICATIONS OF F.E.M. TO CIVIL ENGINEERING
(Elective - II)

Scheme of Instruction Periods per week				Scheme of Examination Marks					
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. The basic Component : A Single element
The concept of an element, various element shapes, displacement models, isoparametric elements, element stresses and strains, direct formulation of element stiffness and loads, variational formulation of element stiffness and loads, consistent loads Vs lumped formulation, condensation of internal degrees of freedom.

2. The overall problem - Assemblage of Elements : Discretisation of a body or structure, mesh refinement Vs higher order elements, inter connections at nodes, effect of displacement models on inter element compatibility, construction of stiffness matrix and loads for the assemblage, boundry conditions, solution of the overall problem, solution techniques, finite element programming, use of package programmes.

3. Applications :
i) Structural Mechanics : Summary of applications in structural mechanics, finite elements for structural mechanics, special techniques, plane stress/strain and plate bending problems, examples.

ii) Soil and Rock Mechanics : Summary of applications, use of finite element method in soil and rock mechanics, examples.

iii) Seepage : Use of finite element methods for analysing seepage problems, examples.

TERM WORK

Term work will consist of atleast 10 assignments based on the above syllabus. Out of these, there should be atleast three assignments involving computer solutions to problems using finite element method.

ORAL

Oral examination will be based on the Term Work.

SUGGESTED REFERENCES

1. Desai, C. S. and Abel, J. F., "Introduction to the Finite Element Method".

2. Krishnamoorthy, C. S., "Finite Element Analysis".

3. Manickaselvan, V. K., "Rudiments of Finite Element Method".

4. Martin, H. C. and Carey, G. F. "Introduction to Finite Element Analysis".

5. Ghali, A. and Neville, A. M. "Structural Analysis".

6. Zienkiewicz, O.C. "The Finite Element Method".

SOIL FOUNDATION STRUCTURE INTERACTION

(Elective - II)

Scheme of Instruction Periods per week				Scheme of Examination Marks				
L	T	P	Time	Theory	Pract.	T.W.	Oral.	Total
4	2	4	3 hrs	100	—	50	50	200

1. Introduction to concept of system analysis. Necessity of considering interaction. Effect on analysis and design of components.

2. Soil foundation interaction. Winkler's basic model. Beam on Winkler's model of soil. Determination of Soil - spring constant. Modification to spring model - introduction. Limitation. Soil as elastic half space. Borowica's solution. Settlements and contact pressures under rigid footings by matrix method. Numerical integration - Contact pressure distribution and its effect on footing design. Effects of local yielding of soil and of eccentric loading. Introduction to relative rigidity of footing, its effects. Numerical solution using thin plate idealisation of raft.

3. Effect of rigidity of superstructure. Simplified approaches. IS Code recommendations. Interaction effects on design of superstructure members.

4. Introduction to use of FEM. Computation of direct stiffness for column and beam element. Steps involved in the use of FEM for interactive analysis.

5. Comparison of Interactive and non-interactive analysis and Design. Descriptive study of effect of relative rigidity of each component/Sub-component on analysis and design of each component/sub component.

TERM WORK

Term work shall consist of at least 8 assignments based on the above syllabus.

ORAL

Oral examination will be based on the term work.

SUGGESTED REFERENCES

1. Foundation Engineering Handbook - Wintercorn and Fang
2. Foundation Engineering - Kaniraj.
3. Foundation Analysis and Design - Bowles.
4. Foundation Engineering - Bramha S. P.
5. Relevant I. S. Codes and Conferences/Short-courses volumes.

SCHEME OF INSTRUCTION & EXAMINATION

FIRST YEAR ENGINEERING

IL MECHANICAL, ELECTRICAL & ELECTRONICS, ELECTRONICS & TELECOMMUNICATION, & COMPUTER ENGINEERING)

IESTER I

Subject	L	T	P	Duration of Theory Exam	MARKS ALLOTED				Total
					Th.	S	P	O	
Applied Mathematics I	3	0	0	3	100	25	0	0	125
Applied Sciences – I (Physics & Chemistry)	4	0	2~	3	100	50	0	0	150
Basic Engineering – I (Civil & Mechanical Engg.)	4	0	2~	3	100	50	0	0	150
Information Technology –I	3	0	2	3	100	50	0	0	150
Engineering Graphics	2	0	4	4	100	50	0	0	150
Communication Skills	2	0	0	0	0	50	0	0	50
Workshop Practice	0	0	4	0	0	50	0	0	50
	18	0	14	-	500	325	0	0	825

SCHEME OF INSTRUCTION / EXAMINATION

FIRST YEAR ENGINEERING

(CIVIL, MECHANICAL, ELECTRICAL & ELECTRONICS, ELECTRONICS & TELECOMMUNICATION, & COMPUTER ENGINEERING)

SEMESTER II

No.	Subject	L	T	P	Duration of Theory Exam	Marks Alloted				Total
						TH	S	P	O	
2.1	Applied Mathematics II	3	0	0	3	100	25	-	-	125
2.2	Applied Science – II (Physics & Chemistry)	4	0	2	3	100	50	-	-	150
2.3	Basic Engineering - II (Electrical & Electronics Engg.)	4	0	2	3	100	50	-	-	150
2.4	Information Technology -- II (Problem solving & Programming)	3	0	2	3	100	50	0	0	150
2.5	Engineering Mechanics	3	0	1	3	100	50	-	-	150
2.6	Social Sciences	2	0	0	0	0	50	-	-	50
2.7	Modern Workshop Practice	0	0	4	0	0	50	-	-	50
2.8	Computer Aided Drafting	0	0	2	0	0	50	-	-	50
	TOTAL	19	0	13	-	500	375	-	-	875

GOA ENGINEERING COLLEGE

CIVIL ENGINEERING DEPARTMENT

SYLLABUS

S.E. CIVIL (SEM.III)

Sr. No.	Subject	Scheme of Instruction Hours/week			Duration in hours of theory paper	Scheme of Examination				
		Lect.	Tuto	Pract		Theory	Int. Asst.	Oral	Pract	Total
CE 3.1	Applied Mathematics-III	3	1	-	3	100	25	-	-	125
CE 3.2	Geology	3	1	2	3	100	25	-	50	175
CE 3.3	Building Construction	3	1	1	3	100	25	-	-	125
CE 3.4	Strength of Materials	3	1	1	3	100	25	-	-	125
CE 3.5	Surveying - I	3	1	2	3	100	25	-	50	175
CE 3.6	Hydraulics - I	3	1	2	3	100	25	-	-	125
		18	6	8		600	150	-	100	850

2)05)2004

(S. B. Sheldarkar)
chairman, B.O.S. in

GOA ENGINEERING COLLEGE

CIVIL ENGINEERING DEPARTMENT

SYLLABUS

S.E. CIVIL (SEM.IV)

Sr. No.	Subject	Scheme of Instruction Hours/week			Duration in hours of theory paper	Scheme of Examination				
		Lect.	Tuto	Pract		Theory	Int. Asst.	Oral	Pract	Total
CE 4.1	Numerical methods in computer programming	3	1	1	3	100	25	-	-	125
CE 4.2	Structural Analysis – I	3	1	1	3	100	25	-	-	125
CE 4.3	Hydraulics-II	3	1	1	3	100	25	50	-	175
CE 4.4	Surveying-II	3	1	2	3	100	25	-	50	175
CE 4.5	Managerial Economics	3	1	-	3	100	25	-	-	125
CE 4.6	Building Drawing –I	3	1	3	4	100	25	-	-	125
		18	6	8		600	150	50	50	850

4. Geotechnical Engineering – II   3   1   1   3   100   25   -   -   125

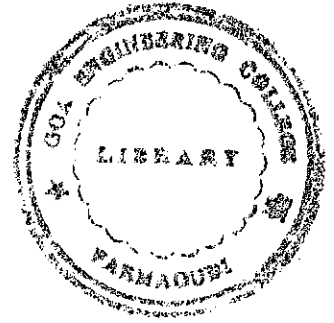# GOA ENGINEERING COLLEGE

CIVIL ENGINEERING DEPARTMENT

SYLLABUS

T. E. CIVIL (SEM. V)

Sr. No.	Subject	Scheme of Instruction Hours/Week Lect.	Tuto.	Pract.	Duration in hours of theory paper	Theory	Internal Assess.	Orals	Practicals	Total
1.	Structural Analysis – II	3	1	1	3	100	25	50	-	175
2.	Geotechnical Engineering – I	3	1	1	3	100	25	-	-	125
3.	Hydraulics – III	3	1	1	3	100	25	-	-	125
4.	Surveying – III	3	1	2	3	100	25	-	-	125
5.	Building Drawing – II	3	1	2	4	100	25	50	-	175
6.	Transportation Engineering – I	3	1	1	3	100	25	-	-	125
		18	6	8		600	150	100	-	850

T. E. CIVIL (SEM. VI)

Sr. No.	Subject	Scheme of Instruction Hours/Week Lect.	Tuto.	Pract.	Duration in hours of theory paper	Theory	Internal Assess.	Orals	Practicals	Total
1.	Structural Design in Steel	3	1	2	3	100	25	50	-	175
2.	Structural Design in Concrete	3	1	2	3	100	25	-	-	125
3.	Transportation Engineering – II	3	1	1	3	100	25	-	-	125
4.	Geotechnical Engineering – II	3	1	1	3	100	25	-	-	125
5.	Quantity Surveying	3	1	1	3	100	25	50	-	175
6.	Environmental Engineering – I	3	1	1	3	100	25	-	-	125
		18	6	8		600	150	100	-	850

GOA ENGINEERING COLLEGE

CIVIL ENGINEERING DEPARTMENT

SYLLABUS

B.E.CIVIL (SEM. VIII)

Sr. No.	Subject	Scheme of Instruction Hours/Week			Duration In hours of theory paper	Scheme of Examination				
		Lect.	Tuto.	Pract.		Theory	Internal Assess	Orals	Practicals	Total
1	1.CAD in Civil Engineering	3	1	3	3	100	25	50	--	175
	2.Elective – III	3	1	3	3	100	25	50	--	175
	3.Elective – IV	3	1	3	3	100	25	50	--	175
	4. Civil Engineering Project.	-	-	11	-	-	25	100	100	225
		9	3	20	-	300	100	250	100	750

List of Electives:

Group –III

2a. Industrial waste Treatment.
2b. Design of Hydraulic Structures.
2c. Design of Machine Foundation
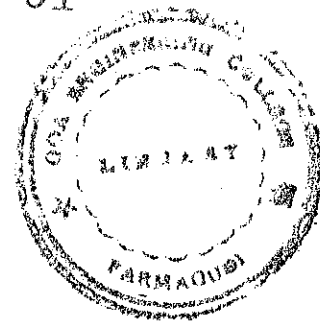2d. Finite Element Analysis.
.2e. Ground Improvement Techniques.

Group - IV
3a. Structural Dynamics
3b. Field Exploration in Rocks.
3c. Engineering Geology – II
3d. Advanced Reinforced Concrete Design

BE - CIVIL   01

GOA ENGINEERING COLLEGE

CIVIL ENGINEERING DEPARTMENT

SYLLABUS

B.E.CIVIL (SEM. VII)

Sr. No.	Subject	Scheme of Instruction Hours/Week			Duration In hours of theory paper	Scheme of Examination				
		Lect.	Tuto.	Pract.		Theory	Internal Assess	Orals	Practicals	Total
1.	Irrigation Engineering	3	1	1	3	100	25	-	-	125
2.	Environmental Engg –II	3	1	1	3	100	25	-	-	125
3.	Structural Design and Drawing in Concrete.	3	1	3	4	100	25	50	.	175
4.	Civil Engg Project.	.	.	2	-	.	-	50	-	50
5.	Elective – I	3	1	2	3	100	25	50	-	175
6.	Elective – II	3	1	2	3	100	25	50	-	175
7.	Seminar.	1	-	-	-	-	25	-	-	25
		16	5	11	-	500	150	200	-	850

List of Electives:

Group –I

5a. Marketing Economics and Sales Management.

5b. Air Pollution.

5c. Applied Hydrology.

5d. Advanced Geotechnical Engineering.

5e. Ground Improvement Techniques.

5f. Soil Dynamics.

5g. Finite Element Method.

Group - II

6a. Advanced Structural Analysis.

6b. Low Cost Housing.

6c. Advanced prestressed Concrete.

6d. Experimental stress Analysis.

6c. Rock Mechanics.