

SRI RAMAKRISHNA MISSION VIDYALAYA
POLYTECHNIC COLLEGE
(AN AUTONOMOUS & ISO 9001:2008 CERTIFIED INSTITUTION)

CURRICULUM AND SYLLABUS

(APPLICABLE TO STUDENTS ADMITTED FROM
2016 - 2017 ACADEMIC YEAR ONWARDS)
(R5 – SCHEME)

DIPLOMA IN CIVIL ENGINEERING
(SECOND AND THIRD YEAR)



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R5 - SCHEME : R E G U L A T I O N S

(For Second Year and Third Year)

Description of the Course:

The Course for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters. This Curriculum for the Diploma Course is applicable for the candidates admitted in first year from 2016-2017 academic year onwards.

Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he has undergone the prescribed course of study in this College for a period of not less than 3 academic years when joined in first year and two years if joined under lateral entry scheme in the second year and passed the prescribed examination. The minimum and maximum period for completion of Diploma course is as given below:

Diploma Course	Minimum Period	Maximum Period
Full Time Regular	3 Years	6 Years
Full Time(Lateral Entry)	2 Years	5 Years

Age Limit: No age limit

Curriculum and Subjects of Study:

The curriculum and subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects.

Examinations:

Autonomous Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester. The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for final external Autonomous examination.

Continuous Internal Assessment Marks:

A. FOR THEORY SUBJECTS:

The internal assessment marks for a total of 25 marks, which are to be distributed as follows:

a)	Subject Attendance	05 marks
b)	Assignments	05 marks
c)	Seminar	05 marks
d)	Continuous Assessment Tests	05 marks
e)	Model Examination	05 marks
	TOTAL	25 Marks

a) Subject Attendance**05 Marks**

(Award of marks for subject attendance to each theory subject is as per the range given below)

80%	-	83%	} 1 Mark			
84%	-	87%		} 2 Marks		
88%	-	91%			} 3 Marks	
92%	-	95%				} 4 Marks
96%	-	100%				

b) Assignments**05 Marks**

For each theory subject three assignments are to be given and the average marks scored is reduced to 05 marks.

c) The Material submitted as well as Seminar presentation**05 Marks**

The students will be given topics either from the subjects (excluding the topics available in the syllabus) or general topics which will help to improve their grasping capacity as well as their capacity to express the subject in hand. The students will be allowed to prepare the material for the given topic using the library hour and they will be permitted to present the seminar (for the 3rd and 4th semesters, the students will be permitted to present the seminar as a group not exceeding six members and for the 5th and 6th semester students will present the seminar individually).

The concerned subject teacher will suggest topics and will evaluate the submitted materials and seminar presentation. (2.5 marks for the material submitted in writing and 2.5 marks for the seminar presentation). For each subject a minimum of two topics are given and the average marks scored is reduced to 05 marks.

d) Continuous Assessment Tests**05 Marks**

Two Continuous Assessment Tests (CAT), each of 2 hours duration for a total of 50 marks, are conducted. The **average of these two test marks** is taken and the marks are reduced to 05.

e) Model Examination**05 Marks**

Model Examination is conducted covering all the five units of 3 hours duration as per the end semester Autonomous examination question paper pattern for a total of 75 marks. The mark obtained is reduced to 05 Marks.

Test	Units	When to conduct	Marks	Duration
CAT - I	Unit - I & II	End of 6 th week	50	2 Hrs
CAT - II	Unit - III & IV	End of 12 th week	50	2 Hrs
Model Exam	Covering all the 5 Units (End Semester Exam question paper pattern)	End of 15 th week	75	3 Hrs

END SEMESTER AUTONOMOUS EXAMINATION - QUESTION PAPER PATTERN
(*Question paper pattern common to all theory subjects unless it is specified*)

PART A - (1 to 8)

Five Questions are to be answered out of **eight** questions for 2 marks each. (Question No. 8 will be the compulsory question and can be asked from any one of the units) (From each unit maximum of two 2 marks questions alone can be asked)

PART B - (9 to 16)

Five Questions are to be answered out of **eight** questions for 3 marks each. (Question No. 16 will be the compulsory question and can be asked from any one of the units) (From each unit maximum of two 3 marks questions alone can be asked)

PART C - (17 to 21)

Five Questions will be asked from each unit in the **either - or** pattern. Students have to answer all the five questions. Each question carries 10 marks. (Based on the discretion of the question setter, he/she can ask two five mark questions (with sub division A & sub division B) instead of one ten marks question, if required)

Any tables required, should be mentioned in the question paper like Steam table, IS Code Book, Steel table, Design Data Book, Mollier chart, Psychometric Chart etc.,

B. FOR PRACTICAL SUBJECTS:

The internal assessment mark for a total of 25 marks which are to be distributed as follows:-

a)	Practical Attendance	05 Marks
b)	Procedure / observation and tabulation / other practical related works	10 Marks
c)	Record writing	10 Marks
	TOTAL	25 Marks

Award of marks for attendance to each practical subject is as per the range given below.

80%	-	83%	}	1 Mark
84%	-	87%		2 Marks
88%	-	91%		3 Marks
92%	-	95%		4 Marks
96%	-	100%		5 Marks

Note:

- *All the Experiments / Exercises indicated in the syllabus should be completed and the same to be given for final Autonomous end semester examinations.*
- *The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.*
- *At the end of the semester, the average marks of all the exercises calculated for 20 marks and the marks awarded for attendance is added to arrive at the internal assessment. (20 + 5 = 25)*
- *The students have to submit duly signed bonafide record note books / files during the Exam.*
- *All the marks awarded for Assignments, Tests, Practical exercise marks and Attendance are entered in the Personal Log Book of the staff, who handles the subject. This is applicable to both, Theory and Practical subjects.*

C. PROJECT WORK:

The students have to do a project work in the final semester as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training. The project work must be reviewed twice in a semester.

i) Internal Assessment Marks:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Details of Assessment	Period of Assessment	Max. Marks
First Review	06 th week	10
Second Review	12 th week	10
Attendance (same as Theory / Practical)	Entire semester	05
Total		25

ii) End Semester Exam:

A neatly prepared PROJECT REPORT as per the format is submitted by individual student during the project work & viva-voce end semester examinations.

Details of mark allocation	Max. Marks
Report Preparation, Demo, Viva-voce	60 Marks
4 questions from question bank consisting of Entrepreneurship, Environmental Management and Disaster Management will be asked. Out of four questions the students have to write any two questions from each topic. 2 questions x 3 topics = 6 questions (6 x 2 ½ = 15 Marks)	15 Marks
Total	75 Marks

Award of Diploma:**Classification of successful candidates:**

Classification of candidates who will pass out the final examinations from April 2019 onwards (Joined in first year in 2016-2017 academic year) in R5-scheme is being done as specified below.

First Class with Superlative Distinction:

A candidate will be declared to have passed in **First Class with Superlative Distinction**, if he secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study of 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction**, if he secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all subjects within the stipulated period of study of 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

First Class:

A candidate will be declared to have passed in **First Class**, if he secures not less than 60% of the aggregate marks in all the semesters put together and passes all the subjects within the stipulated period of study 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

Second Class:

All other successful candidates will be declared as pass in **Second Class**.

Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he has undergone the prescribed course of study successfully and pass all the subjects prescribed in the curriculum.
2. A candidate shall be declared to have passed the examination in a subject if he secures not less than 40% in theory subjects and 50% in practical subjects out of the total prescribed maximum marks including both the Internal Assessment and the End semester Examinations marks put together, subject to the condition that he secures at least a minimum of 30 marks out of 75 marks in the Theory Examinations and a minimum of 35 marks out of 75 marks in the Practical Examinations.

Duration of a period in the Class Time Table:

The duration of each period of instruction is 01 hour and the total period of instruction hours excluding interval and lunch break in a day should be 07 hours corresponding to 07 periods of instruction (Theory & Practical).

Autonomous Examination - Exam Pattern:

Autonomous Examinations for all the Diploma Courses are being conducted in the following Pattern:

Semester	Span of Study	Examination
I, III & V Sem	June - October	October
II, IV & VI Sem	December - April	April

Requirements to appear for Examinations:

A candidate will be permitted to appear for the Autonomous examinations, only if he secures a minimum of overall 80% attendance in the semester concerned.

Condonation of Attendance:

The minimum overall percentage of attendance required for a candidate to become eligible to write the Autonomous end semester examination is 80%. Under extraordinary circumstances, for genuine and valid reasons, Medical reasons, the Principal may condone up to a maximum of 10% shortage to a candidate, subject to the condition that he satisfies all the other requirements to appear for the Autonomous Examination. Under no circumstances a candidate with attendance less than 70% shall be permitted to write the Autonomous Examinations. The condonement of 10% shortage shall not be done as a routine to all candidates, but only for genuine cases; it shall not be claimed as a matter of right by all candidates.

DIPLOMA IN CIVIL ENGINEERING CURRICULUM OUTLINE

THIRD SEMESTER:

Subject Code	Name of Subject	Hours per week			
		Theory	Tutorial / Drawing	Practical	Total
R5-311	Engineering Mechanics	6	–	–	6
R5-312	Construction Materials and Construction Practice	5	–	–	5
R5-313	Surveying - I	5	–	–	5
R5-314	Civil Engineering Drawing	–	5	–	5
R5-315	Material Testing Practical- I	–	–	3	3
R5-316	Surveying Practice - I	–	–	6	6
R5-317	Computer Applications Practical	–	–	4	4
Library cum Seminar		1	–	–	1
TOTAL		17	5	13	35

FOURTH SEMESTER:

Subject Code	Name of Subject	Hours per week			
		Theory	Tutorial / Drawing	Practical	Total
R5-411	Theory of Structures	6	–	–	6
R5-412	Transportation Engineering	5	–	–	5
R5-413	Surveying - II	5	–	–	5
R5-414	Estimating and Costing - I	5	–	–	5
R5-415	Material Testing Practical- II	–	–	3	3
R5-416	Surveying Practice - II	–	–	6	6
R5-417	CAD in Civil Engineering Drawing Practice - I	–	–	4	4
Library cum Seminar		1	–	–	1
TOTAL		22	–	13	35

FIFTH SEMESTER:

Subject Code	Name of Subject	Hours per week			
		Theory	Tutorial / Drawing	Practical	Total
R5-511	Structural Engineering	6	–	–	6
R5-512	Environmental Engineering and Pollution Control	5	–	–	5
R5-513.1	Elective Theory - I: Advanced Construction Technology	5	–	–	5
R5-513.2	Elective Theory - I: Remote Sensing and GIS				
R5-513.3	Elective Theory - I: Soil Mechanics and Foundation Engineering				
R5-513.4	Elective Theory - I: Water Resources Management				
R5-514	Computer Applications in Civil Engineering Practice	–	–	5	5
R5-515	Construction Practice Practical	–	–	3	3
R5-516	CAD in Civil Engineering Drawing Practice - II	–	–	6	6
R5-517	Life and Employability Skill Practical	–	–	4	4
Library cum Seminar		1	–	–	1
TOTAL		17	–	18	35

SIXTH SEMESTER:

Subject Code	Name of Subject	Hours per week			
		Theory	Tutorial / Drawing	Practical	Total
R5-611	Construction Management with MIS	5	–	–	5
R5-612	Hydraulics	6	–	–	6
R5-613.1	Elective Theory - II: Steel Structures	5	–	–	5
R5-613.2	Elective Theory - II: Town Planning				
R5-613.3	Elective Theory - II: Earthquake Engineering				
R5-613.4	Elective Theory - II: Building Services				
R5-614	Estimating and Costing - II	5	–	–	5
R5-615	Hydraulics Practical	–	–	4	4
R5-616	Structural Engineering Practical	–	–	4	4
R5-617	Project Work	–	–	5	5
Library cum Seminar		1	–	–	1
TOTAL		22	–	13	35

SCHEME OF EXAMINATIONS

Subject Code	Name of Subject	Periods Per Week	Periods per Semester (15 weeks)	Scheme of Examination					Minimum for Pass
				Exam Duration in Hrs	Allocation of Marks				
					Internal	External	Total		
THIRD SEMESTER									
R5-311	Engineering Mechanics	6	90	3	25	75	100	40	
R5-312	Construction Materials and Construction Practice	5	75	3	25	75	100	40	
R5-313	Surveying - I	5	75	3	25	75	100	40	
R5-314	Civil Engineering Drawing	5	75	3	25	75	100	40	
R5-315	Material Testing Practical - I	3	45	3	25	75	100	50	
R5-316	Surveying Practice - I	6	90	3	25	75	100	50	
R5-317	Computer Applications Practical	4	60	3	25	75	100	50	
FORTH SEMESTER									
R5-411	Theory of Structures	6	90	3	25	75	100	40	
R5-412	Transportation Engineering	5	75	3	25	75	100	40	
R5-413	Surveying - II	5	75	3	25	75	100	40	
R5-414	Estimating and Costing - I	5	75	3	25	75	100	40	
R5-415	Material Testing Practical - II	3	45	3	25	75	100	50	
R5-416	Surveying Practice - II	6	90	3	25	75	100	50	
R5-417	CAD in Civil Engineering Drawing Practice - I	4	60	3	25	75	100	50	

Subject Code	Name of Subject	Periods Per Week	Periods per Semester (15 weeks)	Scheme of Examination				Minimum for Pass
				Exam Duration in Hrs	Allocation of Marks			
					Internal	External	Total	
FIFTH SEMESTER								
R5-511	Structural Engineering	6	90	3	25	75	100	40
R5-512	Environmental Engineering and Pollution Control	5	75	3	25	75	100	40
R5-513.1	Elective Theory - I: Advanced Construction Technology	5	75	3	25	75	100	40
R5-513.2	Elective Theory - I: Remote Sensing and GIS							
R5-513.3	Elective Theory - I: Soil Mechanics and Foundation Engineering							
R5-513.4	Elective Theory - I: Water Resources Management							
R5-514	Computer Applications in Civil Engineering Practice	5	75	3	25	75	100	50
R5-515	Construction Practice Practical	3	45	3	25	75	100	50
R5-516	CAD in Civil Engineering Drawing Practice - II	6	90	3	25	75	100	50
R5-517	Life and Employability Skills Practical	4	60	3	25	75	100	50
SIXTH SEMESTER								
R5-611	Construction Management with MIS	5	75	3	25	75	100	40
R5-612	Hydraulics	6	90	3	25	75	100	40
R5-613.1	Elective Theory - II: Steel Structures	5	75	3	25	75	100	40
R5-613.2	Elective Theory - II: Town Planning							
R5-613.3	Elective Theory - II: Earthquake Engineering							
R5-613.4	Elective Theory - II: Building Services							
R5-614	Estimating and Costing - II	5	75	3	25	75	100	40
R5-615	Hydraulics Practical	4	60	3	25	75	100	50
R5-616	Structural Engineering Practical	4	60	3	25	75	100	50
R5-617	Project Work	5	75	3	25	75	100	50

R5-SCHEME GENERAL EVALUATION PATTERN (THEORY)

External Examination	-	075 marks
Internal Assessment	-	025 marks
Total	-	100 marks

Condition for pass:

1. In external exam minimum **30** out of **75** marks
2. In internal there is **no** minimum
3. Internal + External must be **40** percent for pass.

Evaluation of Internal Assessment Marks:

The Internal Assessment marks for a total of 25 marks which are distributed as follows:-

a)	Subject Attendance	05 marks
b)	Assignments	05 marks
c)	Seminar	05 marks
d)	Continuous Assessment Tests	05 marks
e)	Model Examination	05 marks
	TOTAL	25 Marks

a) Subject Attendance**05 Marks**

(Award of marks for subject attendance to each Theory subject is as per the range given below)

80%	-	83%	}	1 Mark
84%	-	87%		2 Marks
88%	-	91%		3 Marks
92%	-	95%		4 Marks
96%	-	100%		5 Marks

b) Assignments**05 Marks**

For each theory subject three assignments are to be given and the average marks scored is reduced to 05 marks.

c) The Material submitted as well as Seminar presentation**05 Marks**

The students will be given topics either from the subjects (excluding the topics available in the syllabus) or general topics which will help to improve their grasping capacity as well as their capacity to express the subject in hand. The students will be allowed to prepare the material for the given topic using the library hour and they will be permitted to present the seminar (for the 3rd and 4th semesters, the students will be permitted to present the seminar as a group not exceeding six members and for the 5th and 6th semester students will present the seminar individually).

The concerned subject teacher will suggest topics and will evaluate the submitted materials and seminar presentation. (2.5 marks for the material submitted in writing and 2.5 marks for the seminar presentation). For each subject a minimum of two topics are given and the average marks scored is reduced to 05 marks.

d) Continuous Assessment Tests**05 Marks**

Two Continuous Assessment Tests (CAT), each of 2 hours duration for a total of 50 marks, are conducted. The **average of these two test marks** is taken and the marks are reduced to 05.

e) Model Examination**05 Marks**

Model Examination is conducted covering all the five units of 3 hours duration as per the End Semester Autonomous Examination question paper pattern for a total of 75 marks. The mark obtained is reduced to 5 Marks.

Test	Units	When to conduct	Marks	Duration
CAT-I	Unit - I & II	End of 6 th week	50	2 Hrs
CAT-II	Unit - III & IV	End of 12 th week	50	2 Hrs
Model Exam	Covering all the 5 Units. (End Semester Exam question paper pattern)	End of 15 th week	75	3 Hrs

END SEMESTER AUTONOMOUS EXAMINATION - QUESTION PAPER PATTERN*(Question paper pattern common to all theory subjects unless it is specified)***PART A - (1 to 8)**

Five Questions are to be answered out of **eight** questions for 2 marks each. (Question No. 8 will be the compulsory question and can be asked from any one of the units) (From each unit maximum of two 2 marks questions alone can be asked)

PART B - (9 to 16)

Five Questions are to be answered out of **eight** questions for 3 marks each. (Question No. 16 will be the compulsory question and can be asked from any one of the units) (From each unit maximum of two 3 marks questions alone can be asked)

PART C - (17 to 21)

Five Questions will be asked from each unit in the **EITHER - OR** pattern. Students have to answer all the five questions. Each question carries 10 marks. (Based on the discretion of the question setter, he/she can ask two five mark questions (with sub division A & sub division B) instead of one ten marks question, if required)

* Any tables required, should be mentioned in the question paper like
Steel table, IS Code books, Hand books etc.,

R5-SCHEME GENERAL EVALUATION PATTERN (PRACTICAL)

External Examination	-	075 marks
Internal Assessment	-	025 marks
Total	-	100 marks

Condition for pass:

1. In external practical exam minimum **35** out of **75** marks
2. In internal there is **no** minimum
3. Internal + External must be **50** percent for pass.

Evaluation of Internal Assessment Marks:

The Internal Assessment marks for a total of 25 marks which are to be distributed as follows:-

a)	Practical Attendance	05 Marks
b)	Procedure / observation and tabulation / other practical related works	10 Marks
c)	Record writing	10 Marks
	TOTAL	25 Marks

Award of marks for attendance to each practical subject is as per the range given below.

80%	-	83%	}	1 Mark
84%	-	87%		2 Marks
88%	-	91%		3 Marks
92%	-	95%		4 Marks
96%	-	100%		5 Marks

Note:

- All the Experiments / Exercises indicated in the syllabus should be completed and the same to be given for final Autonomous end semester examinations.
- The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.
- At the end of the semester, the average marks of all the exercises calculated for 20 marks and the marks awarded for attendance is added to arrive at the internal assessment. (20 + 5 = 25)
- The students have to submit duly signed bonafide record note books / files during the Exam.
- All the marks awarded for Assignments, Tests, Practical exercise marks and Attendance are entered in the Personal Log Book of the staff, who handles the subject. This is applicable to both, Theory and Practical subjects.

Project Work:

The students have to do a project work in the final semester as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training. The project work must be reviewed twice in a semester.

a) Internal Assessment:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Details of Assessment	Period of Assessment	Max. Marks
First Review	06 th week	10
Second Review	12 th week	10
Attendance (same as Theory / Practical)	Entire semester	05
Total		25

b) End Semester Exam:

A neatly prepared PROJECT REPORT as per the format is submitted by individual student during the project work & viva-voce end semester examinations.

Details of mark allocation	Max. Marks
Report Preparation, Demo, Viva-voce	60 Marks
4 questions from question bank consisting of Entrepreneurship, Environmental Management and Disaster Management will be asked. Out of four questions the students have to write any two questions from each topic. 2 questions x 3 topics = 6 questions (6 x 2 ½ = 15 Marks)	15 Marks
Total	75 Marks

**DETAILED SYLLABUS
THIRD SEMESTER
R5-311 ENGINEERING MECHANICS**

SUBJECT	INSTRUCTIONS		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-311 ENGINEERING MECHANICS	6 Hrs	90 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	STATICS OF STRUCTURES	16
II	SHEAR FORCE AND BENDING MOMENT IN BEAMS	16
III	GEOMETRICAL PROPERTIES OF SECTIONS	16
IV	SIMPLE STRESSES AND STRAINS	16
V	STRESSES IN BEAMS AND SHAFTS	16
Total Instruction Hours		80

UNIT - I**STATICS OF STRUCTURES****16 Hrs**

Statics of Particles and Rigid Body: Statics – mechanics – engineering mechanics – definition of force – designation of a force – resolution of a force – equations of equilibrium of particle – rigid body – definition – moment of a force – actions and reactions – equations of equilibrium of rigid body – definition of transverse load, concentrated (or) point load, Uniformly Distributed Load (UDL), uniformly varying load – types of supports and reactions – free body diagrams – simple support, roller support, hinged support, fixed support; vertical reaction, horizontal reaction, moment reaction – types of beams based on support conditions – diagrammatic representation of beams, loads and supports – determinate and indeterminate beams and trusses – determination of reactions for determinate beams and trusses (numerical problems)

Analysis of Trusses: Definitions of frame / truss, pin joint, nodes, rafters, ties, struts, slings – nature of forces in the frame members – determinate and indeterminate frames – classification of frames – perfect and imperfect frames – deficient / instable and redundant frames – formulation of a perfect frame – common types of trusses – analysis of frames – assumptions – methods of analysis – analytical methods – method of joints and method of sections – simple problems on analysis of cantilever and simply supported perfect frames (with not more than ten members) with vertical nodal loads by method of joints and method of sections – identification of members with nil force in a determinate truss – Graphical method of analysis of plane frames – steps to be followed with nodal loads (not for examination)

UNIT - II**SHEAR FORCE AND BENDING MOMENT IN BEAMS****16 Hrs**

Definition of shear force and bending moment – conventional signs used for SF and BM – SF and BM of general cases of determinate beams – SF and BM diagrams for cantilevers, simply supported beams and over hanging beams – position of maximum BM – point of contraflexure – derivation of relation between intensity of load, SF and BM – numerical problems on SF and BM (determinate beams with concentrated loads and UDL only)

UNIT - III**GEOMETRICAL PROPERTIES OF SECTIONS****16 Hrs**

Centroid: Geometrical properties – definitions and examples of symmetrical, anti symmetrical, asymmetrical shapes – definitions of centre of gravity and centroid – centroid of symmetrical shapes (solid / hollow square, rectangular, circular, I sections) – centroid of asymmetrical shapes (triangular, semi circular, quadrant, trapezoidal, parabolic sections) – centroid of anti-symmetric shapes (S, Z sections) – built up structural sections – simple problems

Moment of Inertia: Definitions of inertia, moment of inertia, polar moment of inertia, radius of gyration, section modulus, polar modulus – parallel and perpendicular axes theorems – derivation of expressions for MI / polar MI, section modulus and radius of gyration of regular geometrical plane sections (rectangle, circle, triangle) – MI about centroidal axis / base, section modulus, radius of gyration of symmetric, asymmetric, anti symmetric and built up sections – simple numerical problems

UNIT - IV**SIMPLE STRESSES AND STRAINS****16 Hrs**

Introduction to Stresses and Strains: definitions of axial force – types of axial forces on structural members – study of strength of material – mechanical properties of materials – rigidity, elasticity, plasticity, compressibility, hardness, toughness, stiffness, brittleness, ductility, malleability, creep, fatigue, tenacity, durability – definitions of stress and strain – types of stresses – tensile, compressive and shear stresses – types of strains – tensile, compressive and shear strains – complimentary shear stress – diagonal tensile / compressive stresses due to shear – elongation and contraction – longitudinal and lateral strains – Poisson's ratio – volumetric strain – simple problems in computation of stress, strain, Poisson's ratio, change in dimensions and volume etc – Hooke's law – elastic constants – definitions of young's modulus of elasticity – shear modulus (or) modulus of rigidity – bulk modulus – relationship between elastic constants (no derivations) – simple problems – young's modulus values of few important engineering materials

Application of Stress and Strain in Engineering Field: Behaviour of ductile and brittle materials under direct loads – load extension curve (or) stress strain curve of a ductile material – limit of proportionality, elastic limit, yield stress, ultimate stress, breaking stress, actual / nominal stresses – working stress – factor of safety – percentage elongation – percentage reduction in area – significance of percentage elongation and reduction in area of cross section – deformation of prismatic and stepped bars due to uniaxial load – deformation of prismatic bars due to its self weight – numerical problems – composite sections – examples of composite sections in engineering field – advantages – assumptions made – principles of analysis of composite sections – modular ratio – equivalent area – stresses in the materials (no problems)

UNIT - V STRESSES IN BEAMS AND SHAFTS

16 Hrs

Stresses in Beams due to Bending: Types of bending stresses – neutral axis – theory of simple bending – assumptions – moment of resistance – derivation of flexure / bending equation $M / I = E / R = \sigma / y$ – bending stress distribution – curvature of beam – position of NA and centroidal axis – stiffness equation – flexural rigidity – strength equation – significance of section modulus – simple numerical problems

Stresses in Shafts due to Torsion: Definitions of shaft, couple, torque (or) twisting moment – types of shafts (one end fixed and the other rotating, both ends rotating at different speeds) – theory of pure torsion – assumptions – derivation of torsion equation, $T / I_p = \tau_{\max} / R = G\theta / L$ – shear stress distribution in circular section due to torsion – strength and stiffness of shafts – torsional rigidity – torsional modulus – comparative analysis of hollow and solid shafts – power transmitted by a shaft – simple numerical problems

Text Books:

1. R K Bansal, "Engineering Mechanics", Laxmi Publications Pvt.Ltd.,
2. S.B.Junnarkar, "Mechanics of Structures– Vol 1",

Reference Books:

- 1) R.S.Khurmi "Strength of Materials", S.Chand & Company Ltd, New Delhi
- 2) S.Ramamirtham, "Strength of Materials", Dhanpat Rai (2003)
- 3) Vazirani & Ratwani, "Analysis of Structures–Vol 1", Khanna Publishers (2003)
- 4) Sanchayan Mukherjee, "Elements of Engineering Mechanics", PHI Learning Pvt Ltd

Instruction Hours	80 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	90 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-312 CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-312 CONSTRUCTION MATERIALS AND CONSTRUCTION PRACTICE	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	BUILDING MATERIALS	13
II	BUILDING MATERIALS (Contd.)	13
III	FOUNDATION AND MASONRY	13
IV	DOORS, FLOORS, ROOFS, etc.,	13
V	POINTING, PLASTERING, PAINTING, FORM WORK, etc.,	13
Total Instruction Hours		65

UNIT - I**BUILDING MATERIALS****13 Hrs**

Introduction: Physical properties of materials – density, bulk density, specific gravity, porosity, water absorption, permeability, chemical resistance, fire resistance, weathering resistance, thermal conductivity, durability (definitions only)

Rocks and Stones: Rocks – classification of rocks – geological, physical and chemical classification – uses of stones – requirements of a good building stone – natural stones and artificial stones for flooring examples (No detailed description)

Bricks: Definition – brick earth – composition of good brick earth – manufacturing process – classification of bricks – properties of bricks – special types of bricks and their uses – compressive strength of bricks – tests on bricks – grades and corresponding requirements of bricks as per BIS

Lime and Pozzolanas: Sources of lime – classification lime – fat, hydraulic and poor lime – uses of lime, pozzolanic materials – surki, fly ash, ground blast furnace slag, rice husk ash – advantages of addition of pozzolanas

Cement: Definition – composition of ordinary portland cement – functions of cement ingredients – different types of cements – grades of cement (33,43 and 53) – storage of cement – tests of cement – objects of each test – test requirements / BIS specifications of OPC – admixtures – definition – types and uses

Sand: Definition – sand for mortar – types – river sand – ‘M’ sand – requirements of sand

Water: General – requirement of water used in construction works – use of brackish or sea water in construction – permissible limits of deleterious materials in construction water as per BIS – effects of sulphates and chlorides in ground water – minimum pH value

Glass: Definition – constituents of glass – classification of glass – functions and utility – types of glass – sizes and thickness – uses in buildings.

Ceramic Products: Definition – earthenware, stoneware, porcelain, terracotta, glazing, tiles (definitions only) – types of tiles – clay terracing tiles – thermal care tiles – glazed ceramic tiles – fully vitrified tiles – roof tiles – special requirements for floor, wall and roof tiles – sanitary appliances

UNIT - II**BUILDING MATERIALS (Contd.)****13 Hrs**

Mortar: Definition – properties and uses of mortar – types of mortar – cement and lime mortar – mix ratio of cement mortars for different works

Concrete: Definition – constituents of concrete and their requirements – uses of concrete – types of concrete: lime concrete, cement concrete and light weight concrete

Paints and Varnishes: Definition – functions of paint – types of paints and their uses – oil, enamel, emulsion, distemper, cement, aluminium, bituminous and plastic paints – varnishes – definition – characteristics of a good varnish – ingredients of varnish – types of varnish and their uses – oil, turpentine, spirit and water varnish

Metals and Plastics: Types of metals used in construction – cast iron, steel, aluminum, GI, stainless steel – market forms of steel – steel for reinforced concrete – steel for pre-stressed concrete – hot rolled steel sections – cold formed light gauge section – plastics – characteristics and uses of plastics – types – thermoplastics and thermosetting plastics – various plastic products: pipes, taps, tubs, basins, doors, windows, water tanks, partitions – sizes, capacity and uses – advantages and disadvantages of plastics products – UPVC pipes and fittings – asbestos – uses of asbestos

Timber and Timber Products: Types of timber – teak, sal, rosewood, mango, and jack – defects in timber – seasoning of timber – objectives – timber products – veneers, ply woods, particle board, fiber board, hard board, block board, laminated board – uses

Roof Coverings: Definition – objectives and uses – mangalore tiles – AC Sheets – FRP Sheets – GI sheets – Shell roof – RCC roof – advantages – types

Damp Proofing Materials: Materials used for damp proofing – properties and functions of various types of water proofing materials commonly available – chemicals used for grouting / coating porous concrete surfaces – admixtures for cement mortar and cement concrete – functions of admixtures – accelerators, retarders, air repelling chemicals

UNIT - III

FOUNDATION AND MASONRY

13 Hrs

Introduction: Permanent and temporary structures – life of structures – sub structure – super structure – load bearing structure – framed structure – concept of framed structure – advantages of framed structure

Foundation: Definition – objectives of foundation – bearing capacity of soil – definition – maximum/ultimate and safe bearing capacity – bearing capacity of different types of soils – factors affecting bearing capacity – requirements of a good foundation – types of foundations – shallow foundation: spread foundation, isolated column footing, combined footing, continuous footing, raft foundation – deep foundation, pile, stone columns – types of piles: bearing pile, friction pile, under reamed pile – causes of failure of foundation – remedial measures – foundations for cost effective structures

Stone Masonry: Definition – common terms used: natural bed, sill, corbel, course, cornice, coping, weathering, throat, spalls, quoins, string course, lacing course, through stone, plinth, jambs – classification of stone masonry – rubble masonry: coursed, un coursed & random rubble masonry – ashlar masonry – points to be considered in the construction of stone masonry – tools used – trowel, square, spirit level, plumb bob, chisel line & pins, spall hammer, punch, pitching tool

Brick Masonry: Definition – common terms used – header, stretcher, bed joint, lap, perpend, closer, king, queen & bevelled, bat – permissible loads in brick masonry – bond – types – header, stretcher, english bond & flemish bond – one brick thick and one and a half brick thick – 'T' junction in english bond – points to be considered in the construction of brick masonry – cavity bond masonry – defects in brick masonry – maintenance of brick masonry – reinforced brick masonry – purpose – its advantage with respect to strength and earthquake resistance

Partition: Definitions – requirements of good partition walls – types – brick, concrete, glass, aluminum frame with glass sheet, timber, straw board, wood wool, asbestos cement board and plastic board partitions

Water Proofing and Damp Proofing: dampness – causes of dampness – effects of dampness – damp proofing – Damp Proof Courses (DPC) – method of mixing – bad effects of excessive admixtures in RCC – water proofing coats for sump / over head tank walls – methods of grouting

UNIT - IV

DOORS, FLOORS, ROOFS, etc.,

13 Hrs

Doors, Windows and Ventilators: Standard sizes of doors and windows – location of doors and windows – different materials used – doors – component parts – types – framed and panelled – gazed, flush, louvered, collapsible, rolling shutter and sliding doors – windows – types – casement, glazed, bay, corner – pivoted circular and dormer windows – ventilators – definition – purpose – types – mosquito proof – ventilator combined with windows / doors

Hollow Block Constructions: Hollow blocks – advantages of hollow blocks – load bearing and non load bearing hollow blocks – open cavity blocks – face shells, web, gross area, nominal dimensions of blocks, minimum thickness of face shells and web, grades of hollow concrete blocks – materials used, admixtures added – mixing, moulding, placing and compacting, curing, drying – physical requirements – use of light weight aggregates – hollow concrete (hollow block) masonry – construction of walls – advantages of hollow concretes masonry

Stairs: Definition – terms used – location of stair – types – straight, dog legged, open well, bifurcated and spiral stairs – moving stairs (escalators) – lift – components – uses and advantage of lifts over stairs

Floors and Flooring: Floors – definition – types – timber, composite, rcc floors – flooring – definition – materials used – selection of flooring – types – construction methods (as per CPWD / PWD Specifications) – mosaic, granolithic, tiled, granite, marble, pre cast concrete flooring, plastic & PVC tile flooring – carpet tile & rubber flooring

Roof: Definition – types of roof – flat roof – RCC roof – pitched roof – tile roof – shell roof – technical terms – steel roof truss – types: king post, raised chord, howe truss, fan, fink, north light and modified north light trusses

Weathering Course: Weathering course – purpose – materials required – brick jelly concrete preparation – laying procedure – preparation of mortar with damp proof materials for laying pressed clay tiles – pointing and finishing of laid clay tiles – use of thermal resistant weathering tiles

UNIT - V

POINTING, PLASTERING, PAINTING, FORM WORK, etc.,

13 Hrs

Pointing: Objectives – mortar for pointing – methods of pointing (as per CPWD / PWD Specifications) – types of pointing – flush, recessed, weathered, keyed or grooved pointing

Plastering: Definitions – objectives – cement mortars for plastering – requirements of good plaster – methods of plastering – defects in plastering – stucco plastering – acoustic plastering granites silicon – plastering – barium plastering – asbestos marble plastering – faced finishing (structural glazing) sand faced – pebble dash – wall paper finishing–wall tiling

White Washing, Colour Washing, Distempering, Painting & Varnishing : White washing – preparation of surface – application of white wash – colour washing – distempering – preparation of surfaces – application of distemper – painting & varnishing – preparation of surface – application of painting & varnishing

Anti-Termite Treatment: Definition – objectives and uses – methods of termite treatment

Scaffolding, Shoring and Underpinning: Scaffolding – definition – component parts – types – single, double & steel scaffolding, shoring – definition – types – raking, flying and dead shores – underpinning – definition – purpose – types – pit methods – pile method

Form Work: Definition – materials used – requirements of a good form work – form work for column, RC beams and RC slab

Text Books:

1. S.K.Duggal, "Building Materials", New Age International (P) Ltd., II Edition, 2003
2. Ashokkumar Jain, "Building Construction", Laxmi publications (p) Ltd Chennai.I S 2185 Part I & II

Reference Books:

1. P.C.Varghese, "Building Materials", Prentice–Hall of India (P) Ltd., I Edition, 2011.
2. S.C.Rangwala, " Building Materials",Charotar Publishing House, VII Edition, 1982.
3. P.C.Varghese, "BuildingConstructions", Prentice–Hall of India (P) Ltd., I Edition, 2011.
4. Dr. B.C. Punmia, "Building Construction", Laxmi publications (p)Ltd New Delhi.

5. S.C.Rangwala, “ Building Construction”, Charotar Publishing House, VI Edition.
 6. PWD & CPWD Specifications.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Assignments / Discussions	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-313 SURVEYING - I

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-313 SURVEYING - I	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	INTRODUCTION TO SURVEYING AND CHAIN SURVEYING	13
II	COMPASS SURVEYING	13
III	LEVELLING	13
IV	LEVELLING (Contd.)	13
V	CONTOUR SURVEYING AND GLOBAL POSITIONING SYSTEM	13
Total Instruction Hours		65

UNIT - I

INTRODUCTION TO SURVEYING AND CHAIN SURVEYING

13 Hrs

Introduction to Surveying: Definition – objectives and uses of surveying – main divisions of surveying – plane and geodetic surveying – classification of surveying – principles of surveying

Chain Surveying: Introduction – instruments used for chaining – chains and tapes – types – definitions of terms commonly used in chain surveying: survey stations, base line, check line and tie line – ranging: direct and indirect ranging – offset :definition, types, instruments used and procedure of taking an offset – conventional signs – chain surveying: equipments required, field work and recording field notes – errors in chaining – obstacles in chaining: types – tape correction and its necessity – simple problems

UNIT - II

COMPASS SURVEYING

13 Hrs

Angular measurements – necessity – instruments used – prismatic compass: construction details, functions and temporary adjustment – types of meridians – types of bearings: whole circle and reduced bearings, fore and back bearings – computation of

included angles from bearings – computation of bearings from included angles – simple problems – local attraction: detection, correction and simple problems – dip and declination – compass traversing – errors in compass surveying

UNIT - III LEVELLING

13 Hrs

Levelling – definition – level – parts – functions – accessories – types of levels: dumpy level, modern tilting level, quick setting level, automatic and laser level – levelling staff – types – component parts of levelling instrument – definitions of terms used: level surface, horizontal and vertical surfaces, datum, bench marks, reduce level, rise, fall, line of collimation, axis of telescope, axis of bubble tube, station, back sight, fore sight, intermediate sight, change point, height of instrument, focusing and parallax – temporary adjustment of a level – balancing back sight and foresight – principle of levelling – simple levelling – theory of differential levelling (fly levelling) – levelling field book – reduction of levels – height of collimation and rise and fall method – comparison of methods – simple problems on reduction of levels – missing entry calculations – simple problems

UNIT - IV LEVELLING (Contd.)

13 Hrs

Types of leveling – check levelling: definition, field procedure and use – profile levelling or Longitudinal Section(LS): definition, use, field procedure and plotting the profile – CrossSectional leveling (CS): definition, use, field procedure and plotting the cross-section – specimen field book for LS and CS – reciprocal levelling: definition, use and problems on difference in elevation – curvature and refraction: effects, correction and problems – errors in levelling – fundamental lines and desired relationship between them – permanent adjustments of a dumpy level: process

UNIT - V CONTOUR SURVEYING AND GLOBAL POSITIONING SYSTEM

13 Hrs

Contour Surveying: Definition – contour – contouring – characteristics of contours – methods of contouring – direct and indirect methods – tachemetric contouring – interpolation of contours – different methods – contour gradient – uses of contour plan and map – calculation of capacity of reservoir: simple problems

Global Positioning System (GPS): Introduction – maps – types of maps – various satellites used by GPS – differential GPS – fundamentals of GPS – application of GPS – GPS receivers – hand held GPS receiver – function – field procedure – observation and processing applications in Civil Engineering

Text Books:

1. Kanetkar.T.P. & S.V.Kulkarni, "Surveying and Levelling Part 1 & 2 ", Puna vidyarthi griha, Prakashan, 23rd edition, 2008.
2. Punmia.B.C. Ashok K.Jain & Arun K. Jain, "Surveying Volume I ", Laxmi Publications Private Limited,16th edition,2011.

Reference Books:

1. Mimi Das Saikia, Bhargab Mohan Das & Madan Mohan Das, "Surveying", PHI Learning Private Limited, Edition 2010.
2. S. K. Roy, "Fundamentals of Surveying", PHI Learning Private Limited, Edition2010.
3. Learning Material Development Project – NITTTR, Taramani, Chennai, CD programme on GPS and GIS

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Assignments / Discussions	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-314 CIVIL ENGINEERING DRAWING

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-314 CIVIL ENGINEERING DRAWING – I	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	INTRODUCTION	05
II	PLANNING OF BUILDING	05
III	BASIC DRAWINGS	10
IV	BUILDING DRAWINGS	45
Total Instruction Hours		65

UNIT - I

INTRODUCTION

05 Hrs

Conventions, Symbols: General – conventions – title block – scales – line work – lettering – symbols – abbreviations

Building Bye-Laws and Submission Drawings: Objects of bye-laws – importance of bye-laws – function of local authority – setbacks – plot coverage – number of floors – height of building – built up area – Floor Space Index (FSI) – views and details necessary for the preparation of civil engineering drawing – site plan – necessity for approval of plans local body – layout plan and key plan – requirements for submission of drawing for approval

UNIT - II

PLANNING OF BUILDINGS

05 Hrs

Planning of Residential Buildings: Types of residential buildings – usual requirements – types of rooms – minimum size requirement for each type of rooms – furniture arrangement in each room – position of stairs/lifts – position of doors / windows house drainage and sanitary fittings – sump/water tanks – plumbing pipes – preparation of line drawing for given requirements with dimensions(not to scale).

Planning of Industrial Structures: Planning aspects – requirements of industrial units – sheets for pitched roof coverings – rolling shutters – ramps – stores – public toilets/bath rooms – dining/ resting halls – ventilation and lighting – preparation of line drawing for given requirement with measurements (not to scale)

Planning of Public Buildings: Types of public buildings – miscellaneous public buildings – general requirements of public buildings – landscape architecture – preparation of line plan with dimensions for the given requirements (not to scale)

UNIT - III

BASIC DRAWINGS

10 Hrs

Standard symbols used in Civil Engineering drawing – Draw the elevation of

- | | | |
|-------------------------------------|---|----------------------------|
| a) Fully panelled double leaf door | b) Fully panelled single leaf door | c) Flush door |
| d) Fully panelled window with grill | e) Partly glazed and partly panelled window | |
| f) Lean-to-roof | g) King post roof truss | |
| h) Steel roof truss | i) Rain water harvesting - recharging into the ground | |
| | (a) Shallow well system | (b) Percolation pit system |

UNIT - IV

BUILDING DRAWINGS

45 Hrs

Preparation of plan, section and elevation of buildings with specifications for the given line drawing to suitable scale:

1. A reading room with RCC flat roof
2. A house with single bed room and attached bathroom with RCC flat roof.
3. A residential building with two bed rooms with RCC flat roof
4. A house with single bed and hall with partly tiled and partly RCC flat roof.
5. A two roomed house with RCC slope roof with gable ends
6. A house with fully tiled roof with hips and valleys
7. A small workshop with north light steel roof truss (6 to 10 m span) over RCC columns.
8. A primary health center for rural area with RCC roof.
9. A village Library building with RCC flat roof
10. A small restaurant building with RCC flat roof
11. A single storeyed school building with RCC flat roof
12. A bank building with RCC flat roof.

Examination Pattern:

Part A – (Unit I & II – 2 x 3, Unit III – 1 x 9)	-	15 Marks
Part B – (Unit - IV)	-	60 Marks

Text Books:

1. B.P. Verma, "Civil Engineering Drawing and house planning"
2. S.C.Rangwala, "Civil Engineering Drawing",

Reference Books:

1. National Building Code (NBC-2012)
2. TamilNadu District Municipal building rules and by-laws
3. Dr N. Kumaraswamy and A. Kameswara Rao, "Building Planning and Drawing",
4. G. Vaidhyanathan, I. Kulasekaran, G. sathish Kumar "Building Planning and Construction Companion",
5. V.R.Thothathri, "A Guide to Civil Engg Drawing

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Examination	07 Hrs
Revision / Assignments / Discussions	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-315 MATERIAL TESTING PRACTICAL - I

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	
R5-315 MATERIAL TESTING PRACTICAL - I					25	75

PART - A**18 Hrs**

1. Tension test on mild steel and deformed steel bars.
2. Deflection test on simply supported beams of (a) wood & (b) steel to find Young's modulus
3. Torsion test on mild steel bar to determine the modulus of rigidity
4. Determination of the fineness of cement by sieve analysis
5. Determination of normal consistency of cement by Vicat's apparatus.
6. Initial and final setting time of cement with Vicat's apparatus.
7. Determination of soundness test on cement

PART – B**19 Hrs**

8. Finding Brinell's and Rockwell's hardness numbers of the following materials.
(a) Mild steel (b) Brass (c) Aluminum
9. Compression test on wooden cubes.
10. Double shear test on MS bar.
11. Impact test on mild steel by performing Izod / Charpy tests
12. Compression test on bricks / solid blocks.
13. Water absorption test on Bricks / pressed tiles.
14. Flexure test on tiles.

PART - C (Not for Examination)**02 Hrs**

15. Demonstration of strain gauges, strain indicators and strain recording instruments

Examination Pattern:

Note: All the exercises in each section have to be completed. Two exercises will be given for examination, one from Part - A and one from Part - B. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Allocation	Max. Marks
Part - A	40 Marks
Part - B	30 Marks
Viva-voce	05 Marks
Total	75 Marks

Theory & Practical Exercises	39 Hrs
Revision / Repetition	06 Hrs
Total	45 Hrs

R5-316 SURVEYING PRACTICE - I

SUBJECT	INSTRUCTIONS		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-316 SURVEYING PRACTICE - I	6 Hrs	90 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

PART - A**CHAIN AND COMPASS SURVEYING****24 Hrs**

1. Study of chain (unfolding, spreading, aligning, reading and folding), chaining and ranging a line and also taking offsets of objects using cross staff.
2. Determination of area of a plot using chains (minimum two exercises – one base line and at least two offsets on either side of a chain line)
3. Traverse around a building and plot the existing building using chain survey.
4. An experiment to verify the correctness in length of chain using standard gauges.
5. Study of prismatic compass, setting up over a station and observe bearings of lines.
6. Running closed traverse and finding the included angles – minimum 5 points.
7. Determination of distance between two points when their base is accessible.
8. Determination of distance between two points when their base is inaccessible.

PART - B**LEVELLING****48 Hrs**

9. Study of a level –temporary adjustment, taking readings and booking in a field book.
10. Fly levelling – reduction by height of collimation method – minimum 6 bench marks with two change points (minimum four exercises)
11. Fly levelling – reduction by rise and fall method – minimum 6 bench marks with two change points (minimum four exercises)
12. Fly levelling – with inverted readings.(minimum two change points)
13. Check levelling and reduction of levels (minimum four exercises)

PART - C**GLOBAL POSITIONING SYSTEM (GPS)****08 Hrs**

14. Reading of various maps like taluk map and district map consisting of latitudes and longitudes / grid maps.
15. Study of hand held GPS.
16. Measurement of latitude, longitude and altitude (grid map) using hand held GPS.
17. Selection and marking of routings (way points) using hand held GPS.

Examination Pattern:

Note: All the exercises in each section have to be completed. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

PART – A	By lot ONE question from chain and compass surveying	25 Marks
PART – B	Levelling (compulsory)	35 Marks
PART – C	By lot ONE question from GPS	10 Marks
Viva-voce		05 Marks
Total Marks		75 Marks

Allocation of Marks:

S. No	Description	PART - A	PART - B	PART - C
		Max. Marks (25)	Max. Marks (35)	Max. Marks (10)
1	Procedure, Handling Instruments / Tools	5	5	3
2	Field works, Observation and Tabulation	10	15	5
3	Calculations and Check / drawings.	7	12	0
4	Accuracy of result	3	3	2

Theory & Practical Exercises	80 Hrs
Revision / Repetition	10 Hrs
Total	90 Hrs

R5-317 COMPUTER APPLICATIONS PRACTICAL

SUBJECT	INSTRUCTIONS		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-327 COMPUTER APPLICATIONS PRACTICAL	4 Hrs	60 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

SECTION – A**GRAPHICAL OPERATING SYSTEM**

Introduction to GUI OS; Features and various versions of GUI OS & its use; Working with GUI OS; My Computer & Recycle bin; Desktop, Icons and Explorer; Screen description & working styles of GUI OS; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts & Auto start; Accessories and Windows Settings using Control Panel - setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists;

Exercises

1.
 - a. Installing screen saver and change the monitor resolution by 1280 x 960
 - b. Setting wall papers
 - c. Creating, moving, deleting and renaming a folder
 - d. Copy, paste and cut a folder/file
 - e. Displaying the properties for a file or folder
2.
 - a. Restoring files and folders from Recycle bin
 - b. Creating short cuts for folder/file
 - c. Finding a file or folder by name
 - d. Selecting and moving two or more files/folders using mouse
 - e. Sorting folders / files

WORD PROCESSING

Introduction to Word Processing – Examples – Creation of new documents, opening the existing document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header and footer, deleting, moving, replacing and editing text in document. Saving a document, spell checker.

Printing a document – Creating a table, entering & editing – text in tables – Changing format of table – height/width of row or column – Editing & deleting rows / columns in table – Creating columns, applying borders, watermark, shading, Templates, wizards, drawing objects, mail merge.

Exercises

3. Create the following table and perform the operations given below

- Arrange the cell alignment for the complete table as center, center (both horizontally and vertically)
- Fill the days column and Hrs row with 15% gray color
- Implement merging and splitting two or more cells wherever necessary
- Apply alternative foreground colors for columns

DAYS	1	2	3	4	5	6	7	8
MON	← TEST →		A: JPP			CA	RDBMS	TUT
	B:RDBMS							
TUE	CA	OOP	CN	RDBMS	A: RDBMS			
	B: JPP							
WED	CN	RDBMS	OOP	RDBMS	COMMUNICATION		CN	CA
THU	OOP	A: JPP			CA	RDBMS	CN	OOP
	B: RDBMS							
FRI	COMMUNICATION		A: RDBMS		OOP	CN	RDBMS	CA
	B: JPP							
SAT	OOPS	RDBMS	N	CA	-----			

4. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.

5. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background color and add

'Confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction to Analysis Package – Examples – Concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

Exercises

6. Create a result sheet containing Candidate's Register No., Name, and Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

Result is Distinction if Total $\geq 70\%$

First Class if Total $\geq 60\%$ and $< 70\%$ Second Class if Total $\geq 50\%$ and $< 60\%$

Pass if Total $\geq 35\%$ and $< 50\%$ Fail otherwise

Create a separate table based on class by using auto filter feature.

7. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue color and lowest donation with red color. The table should have a heading.

7. Create line chart, bar chart and pie charts to highlight the sales of the company for three different periods for the following data.

SALES BAR CHART

Period	Product 1	Product 2	Product 3	Total
JAN	35	40	50	125
FEB	46	56	40	142
MAR	70	50	40	160

SECTION – B

DATABASE

Introduction – Menus – Tool bar – Create – Edit – Save – Data types – Insert – Delete – Update – View – Sorting and filtering – Queries – Report – Page setup – Print.

Exercises

9. Create Database to maintain at least 10 addresses of your class mates with the following constraints

- Roll no. should be the primary key.
- Name should be not null

10. Create a student's table with the following fields: Sr. No., Reg. No, Name, Marks in 5 subjects. Calculate total and percentage of 10 students. Perform the following queries.

- To find the details of distinction student
- To find the details of first class students
- To find the details of second class students

11. Design a report for the above exercise to print the consolidated result sheet and mark card for the student.

PRESENTATION

Introduction – Opening new presentation, Parts of PowerPoint window – Opening – Saving and closing presentations – Features of PowerPoint, Background design, Word art, Clip art, Drawings, 3D settings – Animations, Sound, Views, types of views – Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show, custom show – Creating custom presentations, action setting, auto content wizard, working with auto content wizard.

Exercises

12. Make a marketing presentation of any consumer product with at least 10 slides.
Use different customized animation effects on pictures and clip art on any four of the ten slides.
13. Create a Presentation about our institution / any subject with different slide transition & sound effect.

INTERNET

Introduction – Getting acquainted with Internet Connection – Browsers – Website URL – Open a website – Net Browsing – Email: Creating E-mail id – Sending, receiving and deleting E-mail – Email with Attachments – CC and BCC – Chatting – Creating Group mail – Google docs – Search Engines – Searching topics.

Most Popular Social Networking Sites: History – Features – Services – Usage of Face book, Twitter and LinkedIn. Transferring data through Wi-Fi or Bluetooth among different devices

Introduction to cybercrime – Software Piracy – Viruses – Antivirus Software

Exercises

14. Create an e-mail id and perform the following
- Write an e-mail inviting your friends to your Birthday Party.
 - Make your own signature and add it to the e-mail message.
 - Add a word attachment of the venue route
 - Send the e-mail to at least 5 of your friends.
15. Create a presentation on Google docs. Ask your friend to review it and comment on it. Use "Discussion" option for your discussions on the presentation.

Software Requirement:

1. Any GUI Operating System
2. Open Source Software / MS - Office

Reference Books:

1. MS OFFICE – Dr. S.S. Srivastava, Laxmi Publications Pvt. Ltd.
2. 2007 MS Office System Plain & Simple – Joyce & Moon, PHI Learning
3. MS Office Home and Student 2007 step by step – Preppernan, Cox & Frye, PHI Learning

Examination pattern:

Note: All the exercises in each section have to be completed. Two exercises will be given for examination, one from Section – A and one from Section – B. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Allocation	Max. Marks
Writing Procedure – One Question from Section A	15
Demonstration	15
Results	05
Writing Procedure – One Question from Section B	15
Demonstration	15
Results	05
Viva voce	05
Total	75 Marks

Theory & practical exercises	50 Hrs
Revision / Repetition	10 Hrs
Total	60 Hrs

**FOURTH SEMESTER
R5-411 THEORY OF STRUCTURES**

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-411 THEORY OF STRUCTURES	6 Hrs	90 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	SLOPE AND DEFLECTION OF BEAMS AND PROPPED CANTILEVERS	16
II	FIXED BEAMS AND CONTINUOUS BEAMS - THEOREM OF THREE MOMENTS METHOD	16
III	CONTINUOUS BEAMS - MOMENT DISTRIBUTION METHOD AND PORTAL FRAMES - MOMENT DISTRIBUTION METHOD	16
IV	COLUMNS AND STRUTS & COMBINED BENDING AND DIRECT STRESSES	16
V	MASONRY DAMS AND EARTH PRESSURE AND RETAINING WALLS	16
Total Instruction Hours		80

UNIT - I**SLOPE AND DEFLECTION OF BEAMS AND PROPPED CANTILEVERS****16 Hrs**

Slope and Deflection of Beams: Deflected shapes / elastic curves of beams with different support conditions – definition of slope and deflection – flexural rigidity and stiffness of beams – Mohr's theorems – area moment method for slope and deflection of beams – derivation of expressions for maximum slope and maximum deflection of standard cases by area moment method for cantilever and simply supported beams subjected to symmetrical UDL & point loads – simple numerical problems on determination slopes and deflections at salient points of cantilevers and simply supported beams from first principles and by using formulae

Propped Cantilevers: Statically determinate and indeterminate structures – stable and unstable structures – examples – degree of indeterminacy – concept of analysis of indeterminate beams – definition of prop – types of props – prop reaction from deflection consideration – SF and BM diagrams by area moment method for UDL throughout the span, central and non-central concentrated loads – propped cantilever with overhang – point of contraflexure – simple problems

UNIT - II**FIXED BEAMS AND CONTINUOUS BEAMS****16 Hrs**

Fixed Beams – Area Moment Method: Introduction to fixed beam – advantages – degree of indeterminacy of fixed beam – sagging and hogging bending moments – determination of fixing end (support) moments (FEM) by area moment method – derivation of expressions for standard cases – fixed beams subjected to symmetrical and unsymmetrical concentrated loads and UDL – drawing SF and BM diagrams for fixed beams with supports at the same level (sinking of supports or supports at different levels are not included) – points of contraflexure – simple problems – determination of slope and deflection of fixed beams subjected to only symmetrical loads by area moment method – simple problems

Continuous Beams – Theorem of Three Moments Method: Introduction to continuous beams – degree of indeterminacy of continuous beams with respect to number of spans and types of supports – simple / partially fixed / fixed supports of beams – general methods of analysis of indeterminate structures – Clapeyron's theorem of three moments – application of Clapeyron's theorem of three moments for the following cases – two span beams both ends with simply supported or fixed ends – two span beams with one end fixed and the other end simply supported – two span beams with one end simply supported or fixed and other end overhanging – determination of reactions at supports – application of three moment equations to three span continuous beams and propped cantilevers – simple problems – sketching of SFD and BMD for all the above cases

UNIT - III**CONTINUOUS BEAMS AND PORTAL FRAMES****16 Hrs**

Continuous Beams – Moment Distribution Method: Introduction to carry over factor, stiffness factor and distribution factor – stiffness ratio or relative stiffness – concept of distribution of unbalanced moments at joints – sign conventions – application of M-D method to continuous beams of two/three spans and to propped cantilever (maximum three cycles of distribution) – finding support reactions simple problems – sketching SFD and BMD for two / three span beams

Portal Frames – Moment Distribution Method: Definition of frames – types – bays and storey – sketches of single / multi storey frames, single / multi bay frames – portal frame (single storey, single bay frame) – sway and non sway frames – analysis of non sway

(symmetrical) portal frames for joint moments by moment distribution method and drawing BMD only – deflected shapes of portal frames under different loading / support conditions

UNIT - IV

COLUMNS AND STRUTS & COMBINED BENDING AND DIRECT STRESSES 16 Hrs

Columns and Struts: Columns and struts – definition – short and long columns – end conditions – equivalent length / effective length – slenderness ratio – axially loaded short column – axially loaded long column – Euler's theory of long columns – derivation of expression for critical load of columns with hinged ends – expressions for other standard cases of end conditions (separate derivations not required) – simple problems – derivation of Rankine's formula for crippling load of columns – factor of safety – safe load on columns– simple problems

Combined Bending and Direct Stresses: Direct and indirect stresses – combination of stresses – eccentric loads on columns – effects of eccentric loads / moments on short columns – combined direct and bending stresses – maximum and minimum stresses in sections – simple problems – conditions for no tension – limit of eccentricity – middle third rule–core or kern for square, rectangular and circular sections – chimneys subjected to uniform wind pressure – combined stresses in chimneys due to self weight and wind load – chimneys of hollow square and hollow circular cross sections only – simple problems

UNIT - V

MASONRY DAMS AND EARTH PRESSURE AND RETAINING WALLS 16 Hrs

Masonry Dams: Gravity dams – derivation of expression for maximum and minimum stresses at base – stress distribution diagrams – simple problems – factors affecting stability of masonry dams – factor of safety – simple problems on stability of dams – minimum base width and maximum height of dam for no tension at base – elementary profile of a dam – minimum base width of elementary profile for no tension.

Earth Pressure and Retaining Walls: Definition – angle of repose /angle of internal friction of soil – state of equilibrium of soil – active and passive earth pressures – Rankine's theory of earth pressure – assumptions – lateral earth pressure with level back fill / level surcharge (angular surcharge not required) – earth pressure due to submerged soils – (soil retained on vertical back of wall only) – maximum and minimum stresses at base of trapezoidal gravity walls – stress distribution diagrams – simple problems – stability of earth retaining walls – simple problems to check the stability of walls – minimum base width for no tension

Text Books:

1. B.C. Punmia, Ashok Jain & Arun Jain," Theory of structures "Laxmi Publications, 9th Edition, April 1992.
2. S. Ramamrutham, "Theory of structures" Dhanpat Rai, April 1997

Reference Books:

1. S.B. Junnarkar, Mechanics of structures (Vol.II) Charator Publishing, 22nd Edition, 1997
2. V.N. Vazirani & M.M. Ratwani, "Analysis of structures"
3. R.L. Jindal , "Elementary Theory of Structures"
4. F.V. Warnock, "Strength of materials" Madhan Mohan Dass, " Structural Analysis" PHI Learning Pvt. Ltd., New Delhi
5. Madhan Mohan Dass, " Structural Analysis" PHI Learning Pvt. Ltd., New Delhi.

Instruction Hours	80 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	90 Hrs

* Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-412 TRANSPORTATION ENGINEERING

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks		Duration	
R5-412 TRANSPORTATION ENGINEERING	5 Hrs	75 Hrs	Internal Assessmet	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	HIGHWAY ENGINEERING	13
II	HIGHWAY ENGINEERING (Contd.)	13
III	RAILWAY ENGINEERING	13
IV	RAILWAY ENGINEERING (Contd.)	13
V	BRIDGE ENGINEERING	13
Total Instruction Hours		65

UNIT - I

HIGHWAY ENGINEERING

13 Hrs

Introduction: General – development of roads in India – modes of transportation – Nagpur plan – ribbon development – advantages of roads – importance of roads in India – requirements of an ideal road – Indian road congress – objects of highway planning – classifications of highways

Highway Pavements: objectives – types of pavement – flexible and rigid pavements – comparative study of flexible and rigid pavements – factors affecting the design of pavements – other types of pavements (description not required)

Geometrical Design of Highways: General – road structure – right of way – land width – width of formation – road camber – super elevation – sight distances – road gradient – road curves – horizontal curves – vertical curves – types – widening of pavement on horizontal curves

Traffic Engineering: Objectives – traffic surveys – road accidents – causes of road accidents – preventive measures – parking – methods of parking – road junctions (grade intersections and grade separators) traffic signals – advantages – types of road signs – express ways

Sub Grade Soil: Significance – soil mass as a three phase system – grain size classification – Atterberg limits – definition and description – IS classification of soils –

compaction – definition – objects of compaction – standard proctor compaction test – shear strength – definition – importance – direct shear test

Road Arboriculture and Lighting: Objects of arboriculture – selection of trees – location of trees – highway lighting – benefits

UNIT - II

HIGHWAY ENGINEERING (Contd.)

13 Hrs

Highway Alignment and Surveys: Definition – principles for ideal highway alignment – factors affecting highway alignment – surveys – engineering surveys – reconnaissance, preliminary and location surveys – project report and drawings – highway re-alignment projects

Road Machineries: Excavating equipments – tractor, bull dozer, grader, scraper, JCB – compaction equipments – road roller – types and description – equipments for bituminous road

Low Cost Roads: General – classifications – earthen road, gravel road, water bound macadam roads – construction with sketches – advantages and disadvantages – maintenance – soil stabilization – methods

Bituminous Roads: General – advantages and disadvantages – bituminous materials used – types of bituminous roads – surface dressing – types – bituminous concrete – maintenance of bituminous roads

Cement Concrete Roads: General – advantages and disadvantages – methods of construction of cement concrete roads with sketches – construction procedure for concrete roads

Hill Roads: Factors considered in alignment – formation of hill roads – hair pin bends – retaining and breast walls

UNIT - III

RAILWAY ENGINEERING

13 Hrs

Introduction: Introduction to railways – history of railways – classifications of indian railways – rail gauges – types – uniformity in gauges – loading gauge – construction gauge

Rails: General – functions of rails – requirements of an ideal rail – types of rail sections – length of rails – welding of rails – wear of rails – coning of wheels – hogged rails – bending of rails – creep of rails – causes and prevention of creep

Sleepers and Ballast: Functions of sleepers – types of sleepers – requirements of sleepers – materials for sleepers – sleeper density – ballast – functions of ballast – requirements of ballast – materials used as ballast

Rail Fastenings and Plate Laying: rail joints – types – rail fastenings – fish plates – fish bolts – spikes – chairs and keys – bearing plates – blocks – elastic fastenings – anchors and anti-creepers – plate laying – methods of plate laying – PQRS method of relaying

Maintenance of Track: Necessity – maintenance of track, bridges and rolling stock

UNIT - IV

RAILWAY ENGINEERING (Contd.)

13 Hrs

Stations and Yards: Definition of station – purpose of railway station – types of stations – wayside, junction and terminal stations – platforms – passenger and goods platforms – definition of yard – types of yard – passenger yard, goods yard, marshalling yard and locomotive yards – level crossings

Station Equipments: General – engine shed – ash pits – examination pits – drop pits – water columns – triangles – turn table – traversers – scotch block – buffer stops – fouling marks – derailing switch – sand hump – weigh bridges

Points and Crossings: Purpose – some definitions – turnouts – right hand and left hand turnouts – sleepers laid for points and crossings – types of switches – crossings – types of crossings

Signalling: General – objects of signaling – types of signaling – based on function and location – special signals – control of movement of trains – different methods – following train system – absolute block system – automatic signaling – pilot guard system – centralized traffic control system

Interlocking: Definition – principles of interlocking – methods of interlocking – tappets and locks system – key system – route relay system – improvements in interlocking and signalling

Rapid Transport System: General – underground railways – advantages – tube railways – its features

UNIT - V

BRIDGE ENGINEERING

13 Hrs

Introduction: Bridge definition – components of bridge – IRC loadings – selection of type of bridge – scour – afflux – economic span – waterway – factors governing the ideal site for bridge – alignment of bridge – factors to be considered in alignment

Foundations: Functions of foundation – types of foundations – selection of foundations – control of ground water for foundation – caisson foundation – coffer dam – types

Classification of Bridges: Classification according to IRC loadings, materials, bridge floor, type of superstructure – culverts and cause ways – classifications with sketches – conditions to construct causeways

Substructure: Abutments – types – piers – types – wing walls – types

Superstructure: Types – description – simple bridge – types according to bridge floor – continuous bridge – cantilever bridge – balanced cantilever bridge – arch bridge – bow-string girder type bridge – rigid frame bridge – suspension bridge – continuous steel bridges – steel arched bridges

Bridge Bearings: Definition – purpose – importance of bearings – types of bearings – Elastomer bearings

Text Books:

1. RANGWALA, "Highway Engineering", Charotar Publishing House Pvt. Ltd., Edition 2010
2. RANGWALA, "Railway Engineering", Charotar Publishing House Pvt. Ltd., Edition 2010

Reference Books:

1. RANGWALA, "Bridge Engineering", Charotar Publishing House Pvt. Ltd., Edition 2009
2. S P CHANDOLA, "A Text Book of Transportation Engineering" S Chand & Company Ltd.,
3. G V RAO, "Principles of Transportation & Highway Engineering" Tata McGraw-Hill Company Ltd.,
4. Madhan Mohan Dass, "Structural Analysis" PHI Learning Pvt. Ltd., New Delhi.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

* Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-413 SURVEYING - II

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-413 SURVEYING - II	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	THEODOLITE SURVEYING	13
II	TACHEOMETRIC SURVEYING	13
III	TRIGONOMETRICAL LEVELLING REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING	13
IV	CURVES	13
V	TOTAL STATION AND GIS	13
Total Instruction Hours		65

UNIT - I**THEODOLITE SURVEYING****13 Hrs**

Introduction – Types of theodolites: transit and non-transit theodolite, vernier and micrometer theodolites – electronic theodolite (principles and description only) – component parts of a transit theodolite – functions – technical terms used in theodolite surveying – temporary adjustments – fundamental lines and relationship between them – measurement of horizontal angle by method of repetition and reiteration – measurement of vertical angle and deflection angle – reading bearing of a line – theodolite traversing – methods – field checks in closed traverse – latitude and departure – consecutive coordinates – independent coordinates – problems on computation of area of closed traverse – balancing the traverse – omitted measurements – simple problems

UNIT - II**TACHEOMETRIC SURVEYING****13 Hrs**

Introduction – Instruments used in tacheometry – systems of tacheometry: Stadia and tangential tacheometry – principles – fixed hair method of tacheometry – distance and elevation formulae – Anallactic lens (no proof): advantages and uses – simple problems – Distomats (description only) – direct reading tacheometers – determination of constants of a tacheometer – tacheometric traverse – errors in tacheometric surveying – simple problems

UNIT - III**TRIGONOMETRICAL LEVELLING, REMOTE SENSING, PHOTOGRAMMETRIC SURVEYING AND HYDROGRAPHIC SURVEYING****13 Hrs**

Trigonometrical Levelling: Introduction – finding elevation of objects – base accessible – base inaccessible: single plane and double plane methods – simple problems on determination of elevation of objects

Remote Sensing, Photogrammetric Surveying and Hydrographic Surveying:

Remote sensing – definition – basic process – methods of remote sensing – applications – photogrammetric surveying – definition – terrestrial and aerial photograph – applications – hydrographic surveying – definition – uses – sounding: definition, purpose, instruments needed – steps in hydrographic surveying

**UNIT - IV
CURVES****13 Hrs**

Introduction – types of curves – designation of curves – elements of simple circular curve – setting out simple circular curve by: offsets from long chords, offsets from tangents, offsets from chords produced and Rankine's method of deflection angles – simple problems – transition curves: objectives – vertical curves : definition and types

UNIT - V**TOTAL STATION AND GEOGRAPHICAL INFORMATION SYSTEM****13 Hrs**

Total Station: Introduction – application of total station – component parts of a total station – accessories used – summary of total station characteristics – features of total station – electronic display and data reading – instrument preparation, setting and measurement (distance, angle, bearing etc.) – field procedure for co-ordinate measurement – field procedure to run a traverse survey – linking data files various application

Geographical Information System (GIS): Introduction – geographical information – development of GIS – components of GIS – steps in GIS mapping– ordinary mapping to GIS – comparison of GIS with CAD and other system – fields of applications: natural resources, agriculture, soil, water resources, wasteland management and social resources – cadastral survey and cadastral records – Land Information System(LIS).

Text Books:

1. Kanetkar.T.P. & S.V.Kulkarni, "Surveying and levelling part 1 & 2", Puna vidyarthi grihard Prakashan,23 edition, Reprint 2008.
2. Punmia.B.C, Ashok K.Jain & Arun K. Jain,"Surveying Volume I", Laxmi, Publications Private the Limited., 16 edition, 2011.

Reference Books:

1. Punmia.B.C, Ashok Jain & Arun K. Jain,"Surveying Volume II & III", Laxmi, Publications th Private Limited., 15 edition, 2011.
2. Mimi Das Saikia, Bhargab Mohan Das & Madan Mohan Das, "Surveying", PHI Learning Private Limited, Edition 2010.
3. S. K. Roy, "Fundamentals of Surveying", PHI Learning Private Limited, Edition 2010.
4. Sathesh Gopi, R.Sathikumar & N.Madhu, Advanced Surveying, (Total Station, GIS, Remote Sensing), Pearson Education, Chennai, 2007.
5. M.Anji Reddy, Remote sensing and Geographical information system, B.S Publications, Edition 2006.
6. Burrough P A, Principles of GIS for Land Resources Assessment, Oxford Publication, 2000.
7. Learning Material Development Project – NITTTR, Chennai, CD programme on GPS and GIS.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-414 ESTIMATING AND COSTING - I

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-414 ESTIMATING AND COSTING - I	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	INTRODUCTION AND APPROXIMATE ESTIMATES	13
II	AREAS AND VOLUMES & EMBANKMENTS AND CUTTINGS	13
III	ANALYSIS OF RATES	13
IV	TAKING OFF QUANTITIES BY TRADE SYSTEM	13
V	TAKING OFF QUANTITIES BY GROUP SYSTEM	13
Total Instruction Hours		65

UNIT - I**INTRODUCTION AND APPROXIMATE ESTIMATES****13 Hrs**

Introduction: Estimation – definition of estimate – necessity of estimates – importance of fair estimation – duties and requirements of a good quantity surveyor – types of estimates – approximate and detailed estimates – main and sub estimates revised estimates – supplementary estimates – maintenance / repair estimates – taking off quantities – trade and group systems – merits of trade/group systems – stages in detailed estimation – units of measurements for materials and works – degree of accuracy in measurements – measurement books – deduction for openings in masonry/plastering / colour washing works – painting coefficients – categories of labourers – material requirements for different items of works – labour requirement for different items of works – standard data book – task or out turn of labourers – cost of materials and wages of labour – schedule of rates – revision of rates – market rates – lead – cost of conveyance – handling charges – lump sum and contingency provisions in estimates – abstract estimates

Approximate Estimates: Necessity of approximate estimates – types – service unit method – plinth area method – carpet area method – cubical content method – typical bay method – rough quantity method – examples for each method – problem on preparation of preliminary / approximate estimates for building projects

UNIT - II**AREAS AND VOLUMES & EMBANKMENTS AND CUTTINGS****13 Hrs**

Areas and Volumes: areas of regular and irregular sections – computation of areas of irregular figures – end ordinate rule, mid ordinate rule, average ordinate rule, trapezoidal rule, Simpson's rule – problems – volumes of regular and irregular solids – computation of volumes of irregular solids – end area rule, mid area rule, average area or mean area rule, trapezoidal rule, Simpson's or prismoidal rule

Embankments and Cuttings: Areas of cross sections of embankments of roads, tank bunds etc – level section and two level section – areas of cross sections of cuttings of canals, drains etc – level section and two level section – determination of volume of earth work in embankment / cutting with level sections of varying heights / depths or with two level sections of uniform height / depth

UNIT - III

ANALYSIS OF RATES

13 Hrs

Analysis of rates or preparation of data for the following building works using standard data book:

1. Cement / lime mortars;
2. Plain cement concrete in foundation / leveling course;
3. Flooring with cement concrete, plastered with cement mortar;
4. Flooring with PCC finished with Ellis pattern cement concrete surface;
5. Flooring with cuddapa slabs;
6. Mosaic / ceramic tiled flooring;
7. Brickwork in cement mortar in foundation;
8. Brickwork in CM in super structure;
9. Brickwork in CM in partition with plastering;
10. Random rubble masonry in CM;
11. Coursed rubble masonry in CM;
12. Lime - surki concrete in weathering course finished with pressed tiles in CM;
13. Reinforced cement concrete in slabs (per UNIT volume / UNIT area);
14. RCC in beams;
15. RCC in columns;
16. RCC in sunshades;
17. Plastering brick masonry with CM;
18. Pointing stone masonry with cement mortar;
19. Painting the wood work;
20. Painting steel work;
21. White / colour washing the plastered surfaces;
22. Form works (strutting, centering, shuttering etc) for slabs / beams / columns
23. Fabrication of steel reinforcement;
24. A.C sheet roofing;
25. Supplying and fixing rain water pipes – exercises.

UNIT - IV

TAKING OFF QUANTITIES BY TRADE SYSTEM

13 Hrs

General – methods of taking off quantities – individual wall method – centre line method – examples – entering the dimensions – standard forms for entering detailed measurements and abstract estimates – rounding of quantities

Preparing detailed estimate using trade system and take off quantities for all items of works in the following types of buildings:

- A small residential building with two / three rooms with RCC flat roof
- A small residential building with two / three rooms with RCC sloped roof
- A two storied commercial building (framed structure) with RCC flat roof
- A community hall with RCC columns and T - beams
- A small industrial building with AC / GI sheet roof on steel trusses

UNIT - V TAKING OFF QUANTITIES BY GROUP SYSTEM

13 Hrs

General – Standard method of measurement – Taking off and Recording the dimensions – order of taking off – dimension paper – entering dimension paper – spacing dimensions – descriptions – cancellation of dimensions – squaring dimensions – method of squaring – checking the squaring – casting up the dimensions – abstracting and billing – function of abstract – use of abstract sheets – order of abstracting – preparing the abstract – checking the abstract – casting and reducing the abstract – writing the bill – method of writing the bill – checking the bill

Preparing detailed estimate using group system and take off quantities for all items of works in the following types of buildings:

- A small residential building with two / three rooms with RCC flat roof
- A small residential building with two / three rooms with RCC sloped roof
- A community hall with RCC columns and T - beams

(Note: The same drawings of UNIT - IV may be practiced and quantities compared)

Text Books:

1. Rangawala, "Estimating & Costing", Charotar Publishing;
2. L.N.Dutta, "Estimating & Costing", Dhanpat Rai & Sons

Reference Books:

1. N.A.Shaw, "Quantity Surveying & Valuation", Khanna Publishers;
2. Bridie, "Estimating & Costing"
3. Indian Standard Code of Practice, IS:1200

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) - General Pattern (Theory)

R5-415 MATERIAL TESTING PRACTICAL - II

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-415 MATERIAL TESTING PRACTICAL - II	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

LIST OF EXPERIMENTS

PART - A

18 Hrs

1. Determination of voids ratio and porosity of sand
2. Determination of liquid limit and plastic limit of the given soil
3. Determination of bulk density and specific gravity of fine aggregates
4. Determination of bulk density and specific gravity of coarse aggregates
5. Proctor's compaction test on clay
6. Direct shear test on sand
7. Field density of soil by core cutter method / sand replacement method

PART - B**12 Hrs**

8. Attrition test on aggregate
9. Abrasion test on aggregate
10. Aggregate crushing value test
11. Aggregate impact value test

PART - C**12 Hrs**

12. Determination of total solids present in the given sample of water
13. Determination of turbidity of water by "Jackson candle turbidity meter."
14. Determination of settleable solids present in the given sample of water / waste water by "Imhoff cone."
15. Determination water absorption test on coarse aggregate

Examination Pattern:

Note: All the exercises in each section have to be completed. Two exercises will be given for examination, one from Part - A (compulsory) and one from Part – B or Part – C. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Part - A	40 marks
Part - B or Part - C	30 marks
Viva-voce	05 marks
Total	75 Marks

Practical Exercises	42 Hrs
Revision / Repetition	03 Hrs
Total	45 Hrs

R5-416 SURVEYING PRACTICE - II

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-416 SURVEYING PRACTICE - II	6 Hrs	90 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

LIST OF EXPERIMENTS**PART - A****THEODOLITE SURVEYING****42 Hrs**

1. Study of a theodolite – temporary adjustments – reading horizontal angles
2. Measurement of horizontal angle by a) Reiteration method (not for exam)
b) Repetition method (not for exam)
3. Determination of distance between two points when their bases are accessible, using theodolite – measuring horizontal angles by repetition method and distances from a theodolite station.

4. Determination of distance between two points when their bases are inaccessible, using theodolite – measuring horizontal angles by reiteration method from a baseline.
5. Run closed theodolite traverse – measuring length, included angles, and bearing at initial station. plot the traverse
6. Measurement of vertical angles to different points
7. Determination of elevation of an object when the base is accessible
8. determination of elevation of an object when the base is inaccessible by a) single plane method b) double plane method

PART – B

TACHOMETRIC SURVEYING

18 Hrs

1. Determination of constants of tacheometer
2. Determination of distance and elevation of points by Stadia tacheometry
3. Determination of gradient between two points (with different elevations) by Stadia tacheometry
4. Determination of distance and elevation of points by Tangential tacheometry

PART – C

TOTAL STATION

20 Hrs

1. Study of total station – general commands used – instrument preparation and setting – reading distances and angles
2. Measurement of distances and co-ordinates of given points, using total station
3. Measurement of altitude of given elevated points, using total station
4. Run closed traverse using total station and plotting the traverse
5. Determination of area of a field / land (enclosed between three or more known points), using total station

SURVEY CAMP - (Outside the Campus)

Duration: 7 days

The objective of the survey camp is to enable the students to get practical training in the field work. Groups of not more than six members in a group will carry out each exercise in survey camp. The camp must involve work on a large area of not less than 30 acres outside the campus. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plotting

15 marks will be allotted for Survey file in the External Examination

Works to be conducted in survey camp:

- i) LS and CS for a road / canal alignment
- ii) Radial tachometric contouring
- iii) Contouring by block levels
- iv) Curve setting by deflection angle
- v) Theodolite / tacheometric traverse (balancing the traverse by Bowditch rule)
- vi) Total station (closed traverse) – plotting and finding the area of the given field

Examination Pattern:

Note: All the exercises in each section have to be completed. Two exercises will be given for examination, one from Part - C (compulsory) and one from Part – A or Part – B.

The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

PART- A & B	By lot One question (Either Theodolite surveying or in tacheometry surveying)	- 35 Marks
PART- C	One question	- 20 marks
	Survey camp	- 15 marks
	Viva-voce	- 05 marks
TOTAL		- 75 marks

MARKS ALLOCATION FOR PART – A & B

S.No	Description	Part – A & B Max. Marks (35)	Part – C Max. Marks (20)
1	Procedure, Handling Instruments / Tools	5	3
2	Field works, Observation and Tabulation	15	7
3	Calculations and Check	10	7
4	Accuracy of result	5	3

Theory & Practical Exercises	80 Hrs
Revision / Repetition	10 Hrs
Total	90 Hrs

R5-417 CAD IN CIVIL ENGINEERING DRAWING PRACTICE - I

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks		Total	
R5-417 CAD IN CIVIL ENGINEERING DRAWING PRACTICE - I	4 Hrs	60 Hrs	Internal Assessment	External Exam	100	3 Hrs
			25	75		

LIST OF EXPERIMENTS

Preparation of drawing using CAD software **02 Hrs**

Introduction of CAD software for preparation of drawings

1. Definition of various commands used in CAD software.
2. Simple exercises for familiarizing the drawing commands in CAD software.

PART - A **12 Hrs**

Draw the given drawings in Computer using available software

3. Section of semicircular arch
4. Elevation of door, partly paneled and partly glazed

5. Preparation of plan showing arrangement of furniture's / fixtures and other features with standard sizes for the followings (each room to be drawn separately-features and furniture's may be pasted from the blocks available in the packages)
 - (i) Living
 - (ii) Bed Room
 - (iii) Kitchen
 - (iv) Toilet
6. Steel Structures: cross section of I, Channel, T, Angle and Tubular section, Compound Beams.
7. Section of load bearing wall from parapet to foundation showing all the details across the section. (single storey)

PART - B**36 Hrs****Draw the building drawing using available CAD software**

8. Plan, section and elevation of single bed roomed building (RCC Roof)
9. Plan, section and elevation of double bed roomed building (RCC Roof)
10. Plan, section and elevation of a primary school building
11. Plan, section and elevation of a hospital building
12. Plan, section and elevation of a workshop with steel columns, steel roof truss and metal sheet roofing of about 300 m² area.
13. Preparation of approval drawing to be submitted to Corporation or Municipality showing required details in one sheet such as
 - a) Site Plan (Land boundary, building boundary, car parking, passage, sanitary layout, septic tank location etc.)
 - b) GF plan, FF plan, section and elevation(line diagram is enough)
 - c) Key plan
 - d) Septic tank plan and section (line diagram)
 - e) Rain water harvesting pit (with all detail)
 - f) Typical foundation details (Column foundation or spread footing)
 - g) Title block showing – joinery details, specification, area statement, colour index, title of the property, space for owners signature and licensed surveyor's signature with address.

Examination Pattern:

Note 1: All the exercises in each section have to be completed. Two exercises will be given for examination, one from Part - A and one from Part – B. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Note 2: Line plan with specifications / data will be given in the question paper.

PART –A	30 marks
PART – B	40 marks
Viva - voce	05 marks
Total	75 marks

Theory & Practical Exercises	50 Hrs
Revision / Repetition	10 Hrs
Total	60 Hrs

FIFTH SEMESTER R5-511 STRUCTURAL ENGINEERING

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-511 STRUCTURAL ENGINEERING	6 Hrs	90 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	REINFORCED CEMENT CONCRETE STRUCTURES	16
II	DESIGN OF T-BEAMS AND LINTELS FOR FLEXURE BY LSM & DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY LSM	16
III	DESIGN OF ONE WAY SLABS AND STAIR CASES BY LSM & DESIGN OF TWO WAY SLABS BY LSM	16
IV	DESIGN OF COLUMNS BY LSM & DESIGN OF COLUMN FOOTINGS	16
V	STEEL STRUCTURES	16
Total Instruction Hours		80

UNIT - I

REINFORCED CEMENT CONCRETE STRUCTURES

16 Hrs

Introduction to Working Stress Method and Limit State Method: Reinforced Cement Concrete (RCC) – materials used in RCC and their basic requirements – purpose of providing reinforcement – different types and grades of cement and steel – characteristic strength and grades of concrete – behaviour of RC members in bending – modular ratio and equivalent area of RC sections – different types of loads on structures as per IS: 875–1987 - different methods of design

Working Stress Method: Assumptions made in the WSM – singly reinforced rectangular sections – strain and stress distribution due to bending – actual and critical neutral axes – under / over reinforced sections – balanced sections – lever arm – moment of resistance of singly reinforced rectangular sections (no problems)

Limit State Method: Concept – advantages – different limit states – characteristic strength and design strength of materials – characteristic loads and design loads – partial safety factors for loads and material strength – limit state of collapse in flexure – assumptions – stress strain curves for concrete and steel – stress block – maximum strain in concrete – limiting values of neutral axis of singly reinforced section for different grades of steel – design stress in tension and compression steel – moment of resistance of singly and doubly reinforced rectangular sections – simple problems

Design of Rectangular Beams for Flexure by LSM: Design requirements – effective spans of cantilever and simply supported beams – breadth and depth requirements of beams – control of deflection – minimum depth requirement for stiffness – minimum concrete cover to reinforcement steel for durability and fire resistance – minimum and maximum areas/ spacing for main reinforcement and side face reinforcement as per IS:456-2000 – development length – anchorage values of bends and hooks – curtailment of reinforcements – design bending moments – design of singly and doubly reinforced

rectangular beams (cantilevers and simply supported beams carrying point loads and UDL only) – simple problems – practice on using design aids, SP16 (not for examination)

UNIT - II

DESIGN OF T-BEAMS AND LINTELS FOR FLEXURE BY LSM & DESIGN OF CONTINUOUS BEAMS FOR FLEXURE AND SHEAR BY LSM **16 Hrs**

Design of T-Beams and Lintels for Flexure by LSM: Cross sections of Tee and L-beams – effective width of flange – neutral axis and MR of singly reinforced T-sections – design of singly reinforced T-beams / L-beams for flexure – simple problems on cantilevers (Inverted-T) and simply supported T- beams – loads on isolated lintels over openings of masonry walls – design BM for isolated lintels carrying rectangular / triangular loads – design of lintel – simple problems

Design of Continuous Beams for Flexure and Shear by LSM: Methods of analysis of continuous beams – effective span – arrangement of loading for critical bending moments – BM coefficients specified by IS:456-2000 – design of rectangular continuous beams (singly and doubly reinforced) using BM coefficients (equal spans & UDL only) for sagging and hogging moments – limit state of collapse in shear – design shear strength of concrete – design shear strengths of vertical / inclined stirrups and bent up bars – principle of shear design – critical sections for shear – SF coefficients specified by IS:456-2000 – nominal shear stress – minimum shear reinforcement – design of vertical stirrups, inclined stirrups and bent up bars for rectangular beams using limit state method – simple problems – practice on use of design aids (not for examination)

UNIT - III

DESIGN OF ONE WAY SLABS AND STAIR CASES BY LSM & DESIGN OF TWO WAY SLABS BY LSM **16 Hrs**

Design of One Way Slabs and Staircases by LSM: Classification of slab – effective spans – loads (DL and IL) on floor / roof slabs and stairs (IS:875-1987) – strength and stiffness requirements – minimum and maximum permitted size, spacing and area of main and secondary reinforcements as per IS:456-2000 – cover requirement to reinforcements in slabs – design of cantilever/ simply supported one way slabs and sunshades by limit state method – design of continuous slabs using bm coefficients – check for shear and stiffness – curtailment of tension reinforcement – anchoring of reinforcement – practice in designing slabs using design aids (not for examination)

Types of stairs according to structural behavior – requirements of stairs – planning a staircase – effective span of stairs – effective breadth of flight slab – distribution of loads on flights – design of cantilever steps – design of doglegged and open well stairs spanning parallel to the flight

Design of Two Way Slabs by LSM: Introduction – effective spans – thickness of slab for strength and stiffness requirements – middle and edge strips – BM coefficients as per IS:456-2000 – design BMs for simply supported, restrained and continuous slabs – tension and torsion reinforcement requirement – design of two way slab using BM coefficients – curtailment of reinforcement – check for stiffness only.

UNIT - IV

DESIGN OF COLUMNS BY LSM & DESIGN OF COLUMN FOOTINGS **16 Hrs**

Design of Columns by LSM: Limit state of collapse in compression – assumptions – limiting strength of short axially loaded compression members – effective length of compression members – slenderness limits for columns – classification of columns – minimum eccentricity for column loads – longitudinal and transverse reinforcement requirements as per IS:456-2000 – cover requirement – design of axially loaded short

columns with lateral ties / helical reinforcement – practice on use of design aids (not for examination)

Design of Column Footings: Basic requirements of footings – types of footings – minimum depth below GL – footings with uniform thickness and varying thickness (sloped footing) – critical sections for BM, transverse / punching shears – minimum reinforcement, distribution of reinforcement, development length, anchorage, cover, minimum edge thickness requirements as per IS:456-2000 – design of isolated footing (square and rectangular) with uniform/ varying thickness by limit state method – for examination: simple problems either on (i) designing size of footing and area of tension steel for flexure only for the given column load and SBC of soil, or on (ii) checking the footing for punching shear and transverse shear only, for the given sizes and other required details of the footing

UNIT - V

STEEL STRUCTURES

16 Hrs

Design of Tension and Compression Members by LSM: General – characteristic actions, partial safety factors for loads, design actions – ultimate strength, partial safety factors for materials, design strengths of materials – rolled steel sections – different forms of tension members – gross area, net area and net effective sectional area of tension members – maximum permitted values of effective slenderness ratio – design strength of tension members against yielding of gross section, rupture of critical section and block shear – design strength of given plates / angles connected to gussets by bolts/welds – design of ties using single/ double angles, t-sections and channels

Different forms of compression members – classification of cross sections – limiting width to thickness ratio – effective sectional area – end conditions and effective length of compression members – maximum permitted values of slenderness ratio – imperfection factor and stress reduction factor – design strength of compression members – simple problems – design of single angle and double angle struts – design of steel columns using rolled steel sections (symmetrical sections only) with or without cover plates (lacing and battens not included)

Design of Simple Beams and Welded Connections by LSM: Classification of steel beams – effective span – design principles – minimum thickness of web – design strength in bending / shear – limiting deflection of beams – lateral buckling of beams – maximum permitted slenderness ratio – plastic moment of resistance and plastic section modulus of sections – shape factor – design of laterally supported simple beams using single / double rolled steel section (symmetrical cross section only) (buildup beams not included)

Types of welds – size, effective area and effective length of fillets welds – requirements of welds – stresses in welds – design strength of fillet / butt welds – lap and butt joints for plates and angles – simple problems on design of welded connections for plates and angles (moment resistant connections not included)

Text Books:

1. N Krishnaraju, “ Reinforced Concrete Design” New Age International Publications, 2012
2. P C Varghese,” Limit state Design of Reinforced Concrete”,PHI Learning Pvt. Ltd, 2011.
3. M.R.Shiyekar “Limit State Design in Structural Steel”, PHI Learning Pvt Ltd, 2011.

Reference Books:

1. S.R.Karve and V.L.Shah,” Limit state Theory and Design of Reinforced Concrete”, Griha Prakashan.
2. Dr.S.Ramachandra,Limit State Design of Concrete Structures”, Scientific publishers, 2004.
3. Mallick and Rangasamy, ”Reinforced Cement Concrete” Oxford-IBH.
4. B C Punmia, “ Limit State Design of Reinforced Concrete”, Laxmi Publications,2007
5. B C Punmia, “ RCC Designs”, Laxmi Publications, 2006
6. S S Bhavikatti, “ Design of RCC and Structural Elements” (RCC Vol I), New Age Int. Pub, 2011
7. I S 456-2000 ; I S 875-1987; I S 800 -2007.
8. Explanatory Hand Book SP24, Design Aid SP 16, Detailing of Reinforcement, SP 34

Instruction Hours	80 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	90 Hrs

*Pattern of the Question paper (Internal and External) - General Pattern (Theory)

R5-512 ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-512 ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	WATER SUPPLY ENGINEERING	13
II	WATER SUPPLY ENGINEERING (Contd.)	13
III	SANITARY ENGINEERING	13
IV	SANITARY ENGINEERING (Contd.)	13
V	POLLUTION CONTROL	13
Total Instruction Hours		65

UNIT - I

WATER SUPPLY ENGINEERING

13 Hrs

Quantity of Water: Water supply – need for protected water supply – objectives of public water supply system – demand – types of demand – per capita demand – prediction of population – problems in arithmetical increase method, geometrical increase method, incremental increase method – sources of water – surface and subsurface sources

Intakes and Conveyance: Intakes – types of intakes – description of intakes – infiltration galleries and infiltration wells in river beds – necessity of pumps – types of pumps – pipes for conveyance of waste – cast iron, steel, GI, cement concrete, RCC, hume and PVC pipes – pipe joints – laying and testing of pipe lines – pipe corrosion – corrosion control.

Quality of Water: Impurities in water – testing of water – collection of water sample – physical, chemical, bacteriological tests – standards of drinking water – water borne diseases and their causes

UNIT - II

WATER SUPPLY ENGINEERING (Contd.)

13 Hrs

Treatment of Water: Object of water treatment – flow diagram of treatment plants – sedimentation – purpose – types of sedimentation – coagulation – coagulants and their

choice – types of sedimentation tanks – filtration – theory of filtration – types and description of filters – disinfection of water – methods – water softening – miscellaneous water treatment (names only) – mineral water – requirements – RO process

Distribution System: Distribution system – methods of distribution – gravity system, pumping system, combined system – systems of water supply – continuous and intermittent supply of water – layouts of distribution – dead end, grid iron, radial and circular systems – service reservoirs – types

UNIT - III

SANITARY ENGINEERING

13 Hrs

Collection and Conveyance of Sewage: Sanitation – purpose – terms – systems of sanitation – quantity of sewage – variation in rate of flow of sewage – estimation of storm water – problems – minimum size of sewer – shapes of sewer (names only) – materials used for sewer – joints in sewer line – laying and testing of sewer lines – ventilation of sewers – cleaning of sewers

Sewer Appurtenances: Sewer appurtenances – manhole – lamp hole – catch basin – street inlet – grease and oil trap – flushing tanks – drainage arrangements in buildings – sanitary fittings – sewage pumps – necessity – types of sewage pumps (names only)

UNIT - IV

SANITARY ENGINEERING (Contd.)

13 Hrs

Treatment and Disposal of Sewage: Objects of sewage treatment – flow diagram of sewage treatment plants – treatment of sewage – primary and secondary treatments – screens – skimming tanks – grit chambers – sedimentation tanks – filters – types and description of filters – activated sludge process – septic tanks for isolated buildings – construction and working of septic tanks – disposal of septic tank effluent – soak pits, dispersion trenches – oxidation ponds – sludge – types – methods of sludge disposal

Solid Waste Management: Solid waste – classification – collection and conveyance of solid waste – disposal of solid waste – necessity – reduction and reuse of solid wastes – methods of solid waste disposal – incineration, dumping, sanitary landfill, composting – energy from waste.

UNIT - V

POLLUTION CONTROL

13 Hrs

Environmental Pollution: Environment – definition – water pollution – sources of water pollution – effects of water pollution – control of water pollution – soil pollution – sources of soil pollution – effects of soil pollution – control of soil pollution – noise pollution – sources of noise pollution – effects of noise pollution – control of noise pollution – air pollution – sources of air pollution – effects of air pollution on human beings, plants, animals, materials – air pollution control equipment – control devices for particulate contaminants – environmental degradation – ozone layer depletion – green house effect – acid rain

Environmental Impact Assessment: Environmental Impact Assessment (EIA) – methodology of EIA – organizing the job – performing the assessment – preparation of Environmental Impact Statement (EIS) – review of EIS – environmental risk assessment – limitation of EIA

Text Books:

- 1 S.K.Garg – Water Supply and Sanitary Engineering, khanna publishers, Delhi
- 2 B C Punmia, "Environmental Engineering", Laxmi Publications, 2010
- 3 B C Punmia, "Waste Water Engineering", Laxmi Publications, 2010

Reference Books:

1. N.N. BASAK – Environmental Engineering, Tata McGraw hill publishing company Ltd., New Delhi, 2010
2. A.KAMALA, D.L.KANTHRAO – Environmental engineering, Tata McGraw hill
3. GURCHARAN SINGH – Water supply and sanitary engineering vol.I &II, Standard pub, Delhi
4. Dr.SURESH K.DHAMEJA – Environmental engineering and management, SK.Kataria&ons, New Delhi.
5. M.ANJI REDDI – Text book of Environmental science and technology, BS Publications, Hyderabad.
6. P.VENUGOPALA RAO – Principles of Environmental science and engineering, PHI, New Delhi.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-513.1 ELECTIVE THEORY - I ADVANCED CONSTRUCTION TECHNOLOGY

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-513.1 ADVANCED CONSTRUCTION TECHNOLOGY	5 Hrs	75Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	DEEP EXCAVATION, COFFER DAMS AND CAISSONS & PILE FOUNDATIONS	13
II	SPECIAL CONCRETE	13
III	PRE-STRESSED CONCRETE	13
IV	PRE FABRICATION SYSTEM AND PRE FABRICATION METHODS	13
V	FIRE PROTECTION IN BUILDINGS, MAINTENANCE AND REHABILITATION OF BUILDINGS AND PRECAUTIONS TO PREVENT CRACKS IN BUILDINGS	13
Total Instruction Hours		65

UNIT - I**DEEP EXCAVATION, COFFER DAMS AND CAISSONS & PILE FOUNDATION 13 Hrs**

Deep Excavation: Definition – problems encountered in deep excavations – methods of timbering – stay bracing, box sheeting, vertical sheeting, runners and sheet piling – precaution to be taken during timbering – dewatering of the foundation trenches – methods – pumping, provision of sumps and side drain cement grouting, freezing process, electro-osmosis process

Coffer Dams and Caissons: coffer dams – definition, uses, selection of cofferdams, design features of cofferdams (theory only), leakage prevention, economic height.

Caissons – definition, uses, construction, materials, typed of caissons, design features of caissons (theory only) floating of caissons, cutting edges, sinking of caissons and tilting of caissons

Pile Foundations: Definition – uses of piles – types of piles – bearing piles and friction piles – classification based on material – stone piles – encased piles – reinforced cement concrete piles – cast-in situ piles and pre cast piles description, advantage and disadvantages – load bearing piles and friction piles – purpose – sheet piles – types – description – choice of type of pile – factors to be considered – pile cap and pile shoe – description- load test on piles – description – pile driving – equipments – types of hammer – choice of hammer – causes of failure of piles – reinforcement requirements for RC piles

UNIT - II

SPECIAL CONCRETE

13 Hrs

Special Concrete: Admixtures – definition – function – classification – uses of different types – quantity to be used. light weight concrete, production of light weight concrete, special concrete production process, curing, advantages, limitations, properties and uses of special concretes of fly ash concrete, fibre reinforced concrete, ferro cement sulphur impregnated concrete, polymer concrete, high performance concrete, self compaction concrete, geo-polymer concrete, recycled aggregate concrete (waste material based) and ready mix concrete – shot crete or guniting – definition – typical arrangement for gunite system

Tests on Concrete: Tests on fresh concrete (slump cone test, compaction factor test, flow test) and hardened concretes (compression test, splitting tensile strength test, and non-destructive test)

UNIT - III

PRE-STRESSED CONCRETE

13 Hrs

Pre-Stressed Concrete: Pre-stressed concrete - definitions – materials used grades of concrete and grades of steel used for pre-stressed concrete – forms of pre-stressing steel – general principle of pre-stressing – nature of concrete steel interface – advantages and applications of pre-stressed concrete – limitations of pre-stressed concrete – types of pre-stressed concrete

Methods of Pre-stressing: Methods of pre-stressing – pretension method – post tension method – source of pre stressing force, pre-tensioning systems and devices – stages of pre-tensioning, post-tensioning systems and devices – stages of post – tensioning

Systems of Pre-stressing: Systems of pre-stressing – Freyssinet system – Magnel Blaton system – Lee-Mc-Call system – causes for losses in pre-stress - losses in pre-stressing – simple numerical problems – remedial measures – composite member.

UNIT - IV

PRE FABRICATION SYSTEM AND PRE FABRICATION METHODS

13 Hrs

Pre Fabrication System: Advantages and disadvantages of prefabrication system – terms defined: prefabricated building, module, composite members, modular co-ordination, system; – basic module – planning modules grid – modules in horizontal plane for residential buildings and industrial buildings – other consideration – module for components:- flooring scheme, beams, columns, walls; staircase - lintel, sunshade – tolerance on dimensions:- length, cross sectional dimension, straightness, squareness, twist, flatness

Pre Fabrication Methods: Characteristics to be considered in devising a system – types of pre fabricated building – load bearing wall type – frame type; design considerations – bearing for pre cast units, joints – requirements of an ideal structural joint – manufacture

of precast concrete elements – place – process – main, auxiliary and subsidiary process; stages of pre casting – preparation and storage of materials – moulding and curing; pre fabrication methods: individual method, battery form method, tilting mould method, flow line production method - extension method.

Handling during transport and storage – handling arrangement – transport – inside the factory – stacking yard to erection site, erection works to be carried out – equipments required

UNIT - V

FIRE PROTECTION IN BUILDINGS, MAINTENANCE AND REHABILITATION OF BUILDINGS AND PRECAUTIONS TO PREVENT CRACKS IN BUILDINGS 13 Hrs

Fire Protection in Buildings: General – causes and effects of fire – precautionary measures to minimize dangers of fire – limiting fire spread – factors to be considered – fire resisting properties of common building material – general rules for fire resisting buildings – alarm system – protection of openings – common wall stair – floor fire extinguishing arrangement – fire protection systems – types – emergency exit arrangements – strong room construction

Maintenance and Rehabilitation of Buildings: Rehabilitation of buildings-demolition of buildings–safety aspects – general – precautions during demolitions – sequence of demolition of operation – demolition process of trusses, girders and beams, walls, flooring – catch plat form – lowering removal and disposal of materials – mechanical demolition – repairs to building – repairing of plastering works – retro fitting of structures – case studies of few buildings

Precautions to Prevent Cracks in Buildings: Cracks – general – hair crack – structural crack – horizontal crack in masonry – vertical / diagonal cracks at walls – RCC beams or pillars – transverse cracks in RCC slab and sunshade – repairs – methods – materials used for filling cracks

Text Books:

1. Concrete Technology – M.S. Shetty
2. Fire Resistant Construction– Building Construction by S.P.Arora and S.P.Bindra

Reference Books:

1. Sinha IS Code of Practice for Earth quake, IS Code of Practice for Fire resistance, IS Code of Practice for pre stressing (2005)
2. Pile foundation– RD Chellis, MIS
3. Construction and foundation Engg– Sinha & Janatha Shau.
4. Principle Fire safety standards for Building Construction – M.Ya Roytman
5. IS: 1343 -1980 Code of practice for pre stressed concrete.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-513.2 ELECTIVE THEORY – I REMOTE SENSING AND GIS

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-513.2 REMOTE SENSING AND GIS	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	FUNDAMENTALS OF REMOTE SENSING	13
II	PHOTOGRAMMETRY	13
III	IMAGE INTERPRETATION AND ANALYSIS	13
IV	FUNDAMENTALS OF GIS	13
V	GIS - DATA ENTRY, STORAGE AND ANALYSIS	13
Total Instruction Hours		65

UNIT - I**FUNDAMENTALS OF REMOTE SENSING****13 Hrs**

Basic concepts of remote sensing – energy sources and radiation principles – electromagnetic radiation – characteristic of real remote sensing system, platforms, sensors, satellite, Indian remote sensing satellite

UNIT - II**PHOTOGRAMMETRY****13 Hrs**

Geometric elements of a vertical photograph – stereoscopic plotting instruments, ortho photos, flight planning

UNIT - III**IMAGE INTERPRETATION & ANALYSIS****13 Hrs**

Fundamentals of air photo interpretation – elements of image interpretation, concepts of digital image processing image rectification and restoration, image enhancement, image classification, application of remote sensing in Civil Engineering

UNIT - IV**FUNDAMENTALS TO GIS****13 Hrs**

Basic concepts of GIS – basic spatial concepts – coordinate systems: definitions - history of development of GIS – components of GIS: hardware, software, data, people and methods – proprietary and open source software – types of data – spatial, attribute data-types of attributes – scales/ levels of measurements – Data Base Management Systems (DBMS).

UNIT - V**GIS - DATA ENTRY, STORAGE AND ANALYSIS****13 Hrs**

Data models - vector and raster data – data compression – data input by digitization and scanning, data storage – attribute data analysis – integrated data analysis – mapping concept – development of map overlay, overlay operation – errors and quality control – Land Information System (LIS) – various GIS applications in Civil Engineering

Text Books:

1. Anji Reddy.M. (1998), Remote Sensing and Geographical information systems.
2. Wolf Paul (1998), Elements of Photogrammetry, McGraw Hill, New Delhi.

Reference Books:

1. Lo & Yeung (2005), Geographic Information Systems, Prentice of India.
2. Lillesand, T.M. & Kiefer R.W. (1998), Remote Sensing and image interpretation, John Wiley & Sons.
3. Burrough P.A. (2000), Principle of Geographical Information Systems for land resources assessment, Clarendon Press, Oxford.
4. Clarke Parks & Crane (2005), Geographic Information Systems & Environmental Modelling, PHI.
5. Shahab Fazal," GIS Basics", New Age International Publications, Chennai

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) - General Pattern (Theory)

R5-513.3 ELECTIVE THEORY – I SOIL MECHANICS AND FOUNDATION ENGINEERING

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-513.3 SOIL MECHANICS AND FOUNDATION ENGINEERING	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	SOIL MECHANICS AND INDEX PROPERTIES & HYDRAULIC PROPERTIES OF SOIL	13
II	CLASSIFICATION AND STRENGTH OF SOIL & STABILIZATION OF SOIL AND SUB-SOIL SAMPLING	13
III	SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES & BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS	13
IV	FOUNDATIONS & FOUNDATIONS IN EXPANSIVE SOIL	13
V	MACHINE FOUNDATION & FOUNDATIONS OF TRANSMISSION LINE TOWERS	13
Total Instruction Hours		65

UNIT - I**SOIL MECHANICS AND INDEX PROPERTIES & HYDRAULIC PROPERTIES OF SOIL**
13 Hrs

Soil Mechanics and Index Properties: Introduction – development of soil mechanics – fields of application of soil mechanics – soil formation – cohesive and cohesion less soil – soil properties 3 phase system – general, index and engineering properties – detailed description – Atterber's limits - simple problems

Hydraulic Properties of Soil: Introduction – permeability – co-efficient of permeability – Darcy's law – factors affecting permeability – permeability tests – simple problems – quick sand conditions

UNIT - II**CLASSIFICATION AND STRENGTH OF SOIL & STABILIZATION OF SOIL AND SUB-SOIL SAMPLING**
13 Hrs

Classification and Strength of Soil: Classification of soil – introduction – necessity – systems of soil classification – field identification of soil – shear strength of soil – introduction – shear strength – Mohr's stress circle – Mohr-Coulomb failure theory – shear strength test – unconfined compression test – Mohr's circle for unconfined compression test – compaction – consolidation – consolidometer – optimum moisture content – Proctor's Compaction test – methods of compaction – degree of compaction – field density of soil – tests – compaction and consolidation – comparison.

Stabilization of Soil and Sub-Soil Sampling: Stabilization of soil – introduction – objects of stabilization – methods of stabilization – soil exploration – introduction – objects of soil exploration – methods of soil exploration – direct, semi-direct and indirect methods – spacing and depth of test borings – boring log – sounding and penetration tests – geophysical methods – sub-soil sampling – disturbed and undisturbed samples – types of samplers – split spoon sampler – thin-walled sampler – chunk sampling

UNIT - III**SEEPAGE ANALYSIS AND SEEPAGE BELOW HYDRAULIC STRUCTURES & BEARING CAPACITY AND SETTLEMENT OF FOUNDATIONS**
13 Hrs

Seepage Analysis and Seepage below Hydraulic Structures: Seepage analysis – introduction – head, gradient and potential – hydraulic gradient – seepage pressure – upward flow (quick condition or quick sand) – types of flow lines – types of flow (definition only) – two dimensional flow (Laplace equation) – velocity potential – properties of flow net – uses of flow net – seepage below hydraulic structures – introduction – hydraulic gradient – piping – exit gradient – Khosla's theory – seepage flow nets below hydraulic structures

Bearing Capacity and Settlement of Foundations: Bearing capacity – introduction – terminology – factors affecting bearing capacity of soils – methods of determining bearing capacity – types of failure in soil – general, local and punching shear failure – analytical methods – Rankine's analysis – Terzaghi's analysis – assumption and limitation – effect of water table – methods of improving bearing capacity of soil – settlement of foundation – introduction – causes and effect of settlement – plate load test – simple problems

UNIT - IV**FOUNDATIONS & FOUNDATIONS IN EXPANSIVE SOIL****13 Hrs**

Foundations: Foundation – introduction – definitions – objectives – requirements of foundation – criteria for selection of type of foundation – types of foundations – shallow and deep foundations – types – foundation at different levels – foundation on made up grounds – deep foundation – introduction – pile foundation – uses of piles – types of piles – caisson foundation – types – selection of piles – pile driving – capacity of piles – pile load test – floating foundation – negative skin friction – pile groups – bearing capacity of pile groups – settlement of pile group

Foundations in Expansive Soil: Introduction – identification of expansive soil – free swell test – differential free swell test – Indian expansive soil – swell potential and swelling pressure – traditional Indian practice – methods of foundation in expansive soils – replacement of soils and “CNS” concept – under reamed pile foundation – remedial measures for cracked buildings

UNIT - V**MACHINE FOUNDATION & FOUNDATIONS OF TRANSMISSION LINE TOWERS****13 Hrs**

Machine Foundation: Introduction – soil dynamics – free vibration and forced vibration – definitions – natural frequency – Barkan’s method Pauw’s method – types of machines and machine foundation – general requirements – design of machine foundations – reciprocating type – centrifugal type – impact type – steps to design – Couzen theory – In-situ dynamic investigation of soil – methods – IS code of practice – design criteria – isolation of foundation – simple problems

Foundations of Transmission Line Towers: Introduction – necessity – forces on tower foundations – general design criteria – choice and type of foundations – design procedures – stability conditions – description – no problems

Text Books:

- 1 B C PUNMIA , “Soil Mechanics and Foundation Engineering”, Laxmi publications (P) Ltd., 2005
- 2 V N S MURTHY , “Soil Mechanics & Foundation Engineering”–Sai Kripa Technical Consultants

Reference Books:

1. SWAMI SARAN , “Analysis and Design of Substructures” (LSD) – Second Edition 2010
2. Dr S B SEHGAL, “A Text Book of Soil Mechanics”, CBS Publishers & Distributors
3. WAYNE C.TENG, “Foundation Design”, Prentice Hall of India (P) Ltd.,

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-513.4 ELECTIVE THEORY - I WATER RESOURCES MANAGEMENT

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
	R5-513.4 WATER RESOURCES MANAGEMENT	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total
25				75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	INTRODUCTION AND HYDROLOGY	13
II	GROUND WATER AND MANAGEMENT OF GROUND WATER	13
III	RIVERS AND RIVER TRAINING WORKS AND STORAGE WORKS	13
IV	DISTRIBUTION WORKS AND MANAGEMENT OF CANAL IRRIGATION	13
V	WATER SHED MANAGEMENT AND WATER HARVESTING AND RECYCLING	13
Total Instruction Hours		65

UNIT - I**INTRODUCTION AND HYDROLOGY****13 Hrs**

Introduction: Water resources – world water inventory – Importance of water resources – necessity for conservation and development of water resources – water resources of India – water resources management – purpose – factors involved in water resources management

Hydrology: Introduction – definition – application of hydrology in engineering – hydrological cycle – precipitation – forms of precipitation – measurements of rain fall – rain gauge – types of rain gauges – rain gauge network – mean rainfall over a drainage basin – methods – radar and satellite measurements of rainfall – runoff – estimation of runoff – losses – hydrograph – UNIT hydrograph – uses

UNIT - II**GROUND WATER AND MANAGEMENT OF GROUND WATER****13 Hrs**

Ground Water: Ground water resources – zones of ground water – aquifer – types – terms used – porosity, permeability, yield, specific yield, specific retention, coefficient of storage, specific capacity – Darcy's law – measurement of yield of well – pumping test – recuperation test – ground water exploration – geophysical methods – electrical resistivity method – seismic resistivity method – logs

Management of Ground Water: Concept of basin management – ground water basin investigations – data collection and field work – mining yield – perennial yield – salt balance – basin management by conjunctive use – artificial recharge of ground water – recharge methods

UNIT - III**RIVERS AND RIVER TRAINING WORKS AND STORAGE WORKS****13 Hrs**

Rivers and River Training Works: Classification of river – major rivers in India and Tamilnadu – inter linking of rivers in India and its importance – flood – flood forecasting – flood control in India. river training – objectives of river training – classification of river

training – methods of river training – levees – guide banks – spurs – types – artificial cut-offs – launching apron – pitching of banks – pitched islands – miscellaneous methods
Storage Works: Surface storage – purpose of surface storage – tanks – types – tank weirs – tank outlet – reservoirs – types – storage capacity of reservoir – methods of determination of storage capacity of reservoir – reservoir losses – dams – classification of dams – selection of dam site – earth dams – types – methods of construction – causes of failure of earth dam – remedial measures – spillway – types – spillway crest gates – types – sluiceway – types

UNIT - IV

DISTRIBUTION WORKS AND MANAGEMENT OF CANAL IRRIGATION 13 Hrs

Distribution Works: Irrigation canal – Typical cross section of canal – components of canal section – classification of canal – alignment of canal – canal head works – types – components of diversion head works – cross drainage works – types – canal losses – lining of canal – necessity – types of lining

Management of Canal Irrigation: Canal irrigation system – need for canal irrigation management – objectives of canal irrigation management – methods of improving canal irrigation management – cropping pattern – need for crop rotation – crop water requirement water delivery system – irrigation scheduling – frequency of irrigation – optimum use of irrigation water – irrigation efficiencies – conservation of water on the field – farmer's participation – irrigation manager

UNIT - V

WATER SHED MANAGEMENT AND WATER HARVESTING AND RECYCLING 13 Hrs

Water Shed Management: Water shed – classification of water sheds – integrated approach for water shed management – role of remote sensing and GIS in water shed management – soil and water conservation – necessity – soil erosion – causes – effects – remedial measures against erosion – contour bunding – strip cropping – bench terracing – check dams – vegetated water way – afforestation – crop residue – land drainage – surface drains – sub surface drains

Water Harvesting and Recycling: Water harvesting – runoff collection – onsite detention basin – ponds – types – Seepage control – methods – evaporation control – recycling of harvested water – waste water recharge for reuse – methods – water logging – remedial measures – soil reclamation

Text Books:

1. Santhosh Kumar Garg, Hydrology and water resources engineering, khanna publishers, Delhi.
2. KSubramanya, Engineering hydrology, Tata McGraw-Hill publishing company Ltd., New Delhi.

Reference Books:

1. G.LAsawa, Irrigation and Water Resources Engineering, New age international(p) Ltd., New Delhi.
2. David Keith Todd., Ground water Hydrology, John wiley & sons, Singapore.
3. Dilip Kumar Majumdar, Irrigation water management – Principles and Practice, PHI Pvt.Ltd. New Delhi 1.
4. Madan Mohan Das & Mimi Das Saikia, Irrigation and water power Engineering, PHI pvt. Ltd, New Delhi-1

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-514 COMPUTER APPLICATIONS IN CIVIL ENGINEERING PRACTICE

SUBJECT	INSTRUCTION		EXAMINATION			
R5-514 COMPUTER PPLICATIONS IN CIVIL ENGINEERING PRACTICE	Hrs / Week	Hrs / Sem	Marks			Duration
	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

LIST OF EXPERIMENTS

PART - A

I ELECTRONIC SPREAD SHEET USING SOFTWARE

18 Hrs

Solving problems involving estimation, analysis and design

1. Prepare the estimate sheet with given data (provide all the measurement details) and calculate the quantity using formula bar.
2. Prepare the abstract sheet for the given data and calculate amount and total amount using formula bar (use separate column for rates and units)
3. Design and analysis problems i) calculate area and elongation using formula bar ii) calculate effective depth 'd' and area of steel 'Ast 'using formula bar
4. For given dimension of masonry / RCC dam ie. top width, bottom width, height of dam , height of water, specific weight of masonry / RCC, Sp. wt of water etc,. Find the base pressure and check the stability of the dam.
5. Finding centre of gravity; IZZ and IYY of I, L,T and channel sections. Note : In addition to the above, similar exercises may be given for practice

PART - B

II. RCC DETAILING USING SOFTWARE

14 Hrs

Generation of detailed drawings for given specification and preparation of bar bending schedule using any one of the available packages or any other suitable packages for the following exercises

6. Continuous one way slab (with three equal spans)
7. Simply supported two-way slab
8. Restrained / continuous two-way slab
9. Singly reinforced rectangular beam
10. Doubly reinforced continuous rectangular beam with two equal span
11. Dog-legged staircase
12. RCC column with square Isolated footing

III RCC STRUCTURES ANALYSIS USING SOFTWARE

21 Hrs

13. Carry out the analysis and design of RCC structures using any one of the available packages or any other suitable packages

IV USING PROJECT MANAGEMENT SOFTWARE**08 Hrs**

14. Develop the CPM / PERT network for the proposed simple building project using any one of the available packages or any other suitable packages

V DRAWING MAPS USING GIS SOFTWARE**04 Hrs**

15. Develop aerial map of given area using any one of the available packages or any other suitable packages (For practice only - not for examination)

Examination Pattern:

Note: All the exercises in each section have to be completed. Two exercises will be given for examination, one from Part - A and one from Part - B. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Part - A	30 marks
Part - B	40 marks
Viva-voce	05 marks
Total	75 marks

Theory & Practical Exercises	65 Hrs
Revision / Repetition	10 Hrs
Total	75 Hrs

R5-515 CONSTRUCTION PRACTICE PRACTICAL

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks		Duration	
R5-515 CONSTRUCTION PRACTICE PRACTICAL	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

PART - A**15 Hrs**

1. Prepare and develop a centre line plan and foundation plan for a given line sketch of a building and Set out spread footing foundation for the same.
2. Setting the layout of columns and footing foundation in the field for a given line plan of a building (framed structure).
3. Setting the layout of columns and footing foundation in the field for a given line plan of building (framed structures) using Theodolite/ Total station
4. Cutting, hooking, cranking and arrangement of reinforcement for: a. Beam b.Lintel and sunshade c. column and footing
5. Casting of RCC beams for the given detail.
6. Casting of RCC slabs for the given detail.

PART - B**24 Hrs**

7. Determination of fineness modulus of fine aggregate sample and plot a particle size distribution curve and also find the effective size and uniformity co-efficient.
8. Determination of fineness modulus of coarse aggregate sample and plot a particle size distribution curve and also find the effective size and uniformity co-efficient.
9. Determination of bulking characteristics of the given sand sample .
10. Shape test for coarse aggregate. a. Flakiness Index test b. Elongation Index test c. Angularity number test
11. Determination of workability of concrete by slump cone test and flow table test.
12. Determination of workability of concrete by compaction factor test.
13. Vee-Bee Consistometer test on concrete.
14. Casting and testing (compression) of concrete cubes / cylinders.
15. Determine the compressive strength of concrete cubes by destructive and non-destructive testing (rebound hammer test) and compare the results.

Examination Pattern:

Note: All the exercises in each section have to be completed. Two exercises will be given for examination, one from Part - A and one from Part - B. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Allocation of marks	Part - A	Part - B
Procedure and Equipment handling	15 marks	10 marks
Calculation and Tabulation	10 marks	25marks
Result	05 marks	05 marks
Viva-voce	05 Marks	
Total	75 marks	

Practical Exercises	39 Hrs
Revision / Repetition	06 Hrs
Total	45 Hrs

R5-516 CAD IN CIVIL ENGINEERING DRAWING PRACTICE - II

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-516 CAD IN CIVIL ENGINEERING DRAWING PRACTICE - II	6 Hrs	90 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

LIST OF EXPERIMENTS**PREPARATION OF DRAWINGS USING CAD SOFTWARE****I PUBLIC HEALTH ENGINEERING 12 Hrs**

Draw plan and sectional views of the following:

1. Rapid sand filter
2. Septic tank with dispersion trench / soak pit.
3. RCC square over head tank supported by four columns.

II BRIDGE DRAWING 12 Hrs

Draw plan and sectional views of the following:

4. Two span tee beam bridge with square returns
5. Steel foot over bridge across a highway

III STRUCTURAL ENGINEERING 56 Hrs

Draw plan, cross section and longitudinal sectional views of the following:

6. Simply supported two-way slab
7. Continuous one-way slab (with three equal spans)
8. Restrained two-way slab
9. Singly reinforced rectangular beam
10. Doubly reinforced continuous beam (with two equal spans)
11. Tee beams supporting continuous slab
12. Lintel and sunshade
13. Dog-legged staircase
14. RCC column with square isolated footings
15. Steel beam to steel column connections – seat angle and web angle connections.

*** At least two drawings in each part (I, II & III) must be drawn manually. The same should be submitted as record work for examination.**

Examination Pattern:

Note: All the exercises in each section have to be completed. One exercise will be given for examination. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Plan / Elevation	40 marks
Cross section / longitudinal section	30 marks
Viva-voce	05 Marks
Total	75 marks

Theory & Practical Exercises	80 Hrs
Revision / Repetition	10 Hrs
Total	90 Hrs

R5-517 LIFE AND EMPLOYABILITY SKILLS PRACTICAL

SUBJECT	INSTRUCTIONS		EXAMINATION			Duration
	Hours / Week	Hours / Sem	Marks			
			Internal Assessment	External Exam	Total	
R5-517 LIFE AND EMPLOYABILITY SKILLS PRACTICAL	4 Hrs	60 Hrs	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl. No.	Topics	Hours
1	Part – A: LISTENING ACTIVITY TOPICS: Global Warming, Pollution, Environment	12
2	Part – B: SPEAKING ACTIVITY TOPICS: Communication; Behavioural Skills; Productivity – Comparison with developed countries; Occupational Safety, Health Hazard; Accident & Safety, First-Aid;	28
3	Part – C: WRITING AND READING ACTIVITY TOPICS: Facing Interviews; Entrepreneurship and Project Preparation	08
4	Part – D: GOOGLE SEARCH AND PRESENTATION in Record note (for Continuous Assessment as Assignments on any five topics) TOPICS: Productivity; Quality Tools, Quality Circles, Quality Consciousness; Labour Welfare Legislation, Labour Welfare Acts; Gender Sensitisation (a. Important Constitutional & Legal Provisions for Women in India, b. Harassment of Women at Workplace (Prevention & Prohibition & Redressal) Act 2013, c. Guidelines & Norms laid down by Hon'ble Supreme Court in Vishaka and Others, d. National Commission for Protection of Child Rights (NCPCR), e. Protection of Children from Sexual Offences (POCSO) Act & Rule 6 of POCSO Rules, 2012.	12
TOTAL		60 Hrs

TOPICS AND ALLOCATION OF HOURS:

S.No	Section	Skills to be Acquired	Activity	No. of Hours
1	Part – A LISTENING ACTIVITY TOPICS: Global Warming, Pollution, Environment	<ul style="list-style-type: none"> • Deductive / Reasoning Skills • Cognitive Skills • Retention Skills 	<ul style="list-style-type: none"> • Taking down notes / hints • Answering questions • Fill in the blanks the exact words heard 	04 04 04
2	Part – B SPEAKING ACTIVITY TOPICS: Communication; Behavioural Skills; Productivity – Comparison with developed countries; Occupational Safety, Health Hazard; Accident & Safety, First-Aid;	<ul style="list-style-type: none"> • Personality/Psychological Skills • Pleasing & Amiable Skills • Assertive Skills • Expressive Skills • Fluency/Compatibility Skills • Leadership/Team Spirit Skills 	<ul style="list-style-type: none"> • Instant sentence making • Say expressions /phrases • Self introduction/ another higher official in company • Describe/explain products • Dialogues on technical grounds • Discuss & interact • Group Discussion 	02 02 04 06 06 08
3	Part – C READING AND WRITING ACTIVITY TOPICS: Facing Interviews; Entrepreneurship and Project Preparation	<ul style="list-style-type: none"> • Creative & Reasoning Skills • Creative & Composing Skills • Attitude & Aim Skills • Entrepreneurship Skills 	<ul style="list-style-type: none"> • Frame questions based on patterns • Make sentences based on patterns • Prepare a resume • Prepare an outline of a project to obtain loan from bank in becoming an entrepreneur 	02 02 02 02
4	Part – D Google search and Presentation in Record note (for Continuous Assessment as Assignments on any five topics) Topics: Productivity; Quality Tools, Quality Circles, Quality consciousness; Labour Welfare Legislation, Labour Welfare Acts; Gender Sensitisation (a. Important Constitutional & Legal Provisions for Women in India, b. Harassment of Women at Workplace (Prevention & Prohibition & Redressal) Act 2013, c. Guidelines & Norms laid down by Hon'ble Supreme Court in Vishaka and Others, d. National Commission for Protection of Child Rights (NCPCR), e. Protection of Children from Sexual Offences Act & Rule 6 of POCSO Rules, 2012.	<ul style="list-style-type: none"> • Cognitive Skills • Presentation Skills& • Interactive Skills 	<ul style="list-style-type: none"> • Search in the website • Prepare a presentation • Discuss & interact • Record as assignment 	12

LEARNING STRUCTURE**100 Marks**

- Focus more on Speaking & Listening Skills
- Attention less on Reading & Writing Skills
- Apply the skills in fulfilling the Objectives on Focused Topics

a) Listening**25 Marks**

1. Deductive Reasoning Skills (taking down notes/hints)	10
2. Cognitive Skills (answering questions)	10
3. Retention Skills (filling in blanks with exact words heard)	05

b) Speaking Extempore / Prepared**30 Marks**

1. Personality/Psychological Skills (instant sentence making)	05
2. Pleasing & Amiable Skills (say in phrases/expressions)	05
3. Assertive Skills (introducing oneself/others)	05
4. Expressive Skills (describe/explain things)	05
5. Fluency/Compatibility Skills (dialogue)	05
6. Leadership/Team Spirit Skills (group discussion)	05

c) Writing & Reading**20 Marks**

1. Creative & Reasoning Skills (frame questions on patterns)	05
2. Creative & Composing Skills (make sentences on patterns)	05
3. Attitude & Aim Skills (prepare resume)	05
4. Entrepreneurship Skills (prepare outline of a project)	05

d) Continuous Assessment (Internal Marks)**25 Marks**

(search, read, write down, speak, listen, interact & discuss)

1. Cognitive Skills (Google search on focused topics)
2. Presentation Skills & Interactive Skills (after listening, discuss)

Total Marks:**100 Marks****CONTINUOUS ASSESSMENT (INTERNAL MARKS)**

I	LISTENING (3 exercises), SPEAKING (6 exercises) and READING & WRITING (4 exercises). All activities shall be recorded in the Record note. 13 exercises x 10 marks = 130 marks. Reduced to 10 marks	10 Marks
II	Present in the Record Note on any 5 topics prescribed in syllabus as Assignments Topics. 5 Assignments x 10 Marks = 50 marks. Average of 5 Assignments is 10 marks	10 Marks
III	Attendance	05 Marks
Total		25 Marks

MODEL QUESTION**Time: 3 Hours****Maximum Marks: 75****A. LISTENING****25 Marks**

1. Listen to the content and take down notes/hints 10
2. Listen to the content and answer the following questions. 10
3. Listen to the content and fill in the blanks the exact words heard. 05

B. SPEAKING**30 Marks**

1. Say in a sentence instantly on hearing the word (5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your Dept. Introduce him to your subordinates. 05
4. Explain/describe the product you are about to launch in the market. 05

5. Speak with your immediate boss about the progress you have made. 05
 6. Discuss within the group on the topic of focus prescribed in the syllabus. 05

C. WRITING & READING**20 Marks**

1. Make sentences from the pattern given by changing sets of words with your own. 05

1.	When	do	you	return?
b.	How	is	his performance?	
c.	Where	has	the manager	gone?
d.	What	is	the progress	today?
e.	Why	are	the machines	not functioning?

2. Make sentences from the pattern given by changing sets of words with your own. 05

a.	The workers	are	on strike		
b.	The labourers	are paid	well	in this factory	
c.	There	is	a rest room	for the workers	
d.	These	are	the new products	launched	by our company
e.	Almost everyone	came	to the company	on motorbikes	

3. Prepare a resume for the post of Department Manager. 05
 4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

I. Guidelines for setting the question paper:**A. LISTENING:**

Only Topics related to POLLUTION / ENVIRONMENT / GLOBAL WARMING are to be taken for listening section. The same after / Topic should not however be repeated in the above 3 Listening Activities.

B. SPEAKING:

- WORDS of common usage
- Fragments – expression of politeness, courtesy, cordiality
- Introduce yourself as an engineer with designation or Introduce the official visiting your company/department
- Describe/Explain the product/machine/department
- Dialogue must be with someone in the place of work.
- Group of six/eight Discuss the focused topic prescribed in the syllabus

C. WRITING & READING:

- Provide five different structures.
Students are to substitute at least one set with some other word/words
- Provide five different structures.
Students are to substitute at least one set with some other word/words
- Provide some post related to industries.
- Outline of the project (skeleton/structure) Only the various headings and subheadings
Content is not needed

II. Conduct of End Practical Examination with Allocation of time for each Part:**PART – C. WRITING & READING:**

Firstly, the students are seated after all the formalities are completed and they shall be asked to write on the answer paper the Written & Reading (Part - C) for half an hour.

DURATION: 30 Minutes + (15 extra minutes, while other student attends Speaking Part)

PART – A. LISTENING:

Secondly, after 30 minutes of the Start of the Examination, they may be asked to stop Writing and shall be directed to start the Listening (Part – A) of the End Examination on a separate sheet of paper. They shall also be given instructions that once the Listening Part is completed their papers shall be collected. The First of the Listening Topic decided by both external and internal Examiners shall be read to the students for three to five minutes. As they listen they can take down notes. They shall be given 10 minutes to restructure the notes, if necessary. Then, the Second Listening Topic (a different topic) shall be read to the students. They shall be asked to write the answers for the 5 questions given one after another within 10 minutes. Next, the Third topic (a new topic) is read to the students. Then they are dictated the sentences with 5 blanks, on which they shall fill in the exact word heard. This shall be completed in 10 minutes. Thus the LISTENING PART can be completed in 45 Minutes. The Listening part of the answer papers are collected from the students, immediately after.

DURATION: 45 Minutes

PART – B. SPEAKING

Thirdly, as the Speaking (Part – B) starts, the students are asked to resume the Written & Reading (Part – C) and complete within half an hour. The Examiners, both Internal and External shall take 14 (8+6) or 16 (8+8) students of their choice in the batch of 30 candidates. Initially, each Examiner on their part shall call each student one after another to answer to the first four questions (1 to 4), individually within a time span of 50 minutes. Once all the 4 questions are done, the Examiner shall divide them into groups of 6/8 students. Then the examiner can have the group discussion for 5 minutes followed by dialogue in pairs from the group for 3 minutes per pair (4 pairs x 3 minutes = 12 minutes) Then the examiner has the next group of students with whom the examiner conducts the group discussion followed by dialogues in pairs for the same duration. Thus each examiner can finish 16 students in 1 hour 30 minutes, the Part – B Speaking Part.

DURATION: 90 Minutes simultaneously by Each Examiner for 16 students of each set

NOTE: While awarding marks for this SPEAKING (Part – B), the following shall be observed for uniformity in evaluation.

Question 1:

Relevant expression of thought (1 mark for each sentence uttered)

Question 2:

Relevant expressions of Politeness / Courtesy / Etiquette / Mannerism / Request (NOT necessarily each of these but in general 5 Expressions uttered, award 1 mark each)

Questions 3, 4 and 5:

While evaluating each student, the student's Posture, Gestures, Dress code, Pronunciation (2 marks) and Relevance to the content (3 marks) shall be observed and then marks be awarded accordingly.

Question 6: GROUP DISCUSSION

NOTE: The Examiner shall choose a topic from the Question Bank provided in the Syllabus for the group of 6/8 students. The same topic shall not be repeated in any other group or batch.

While assessing and evaluating each of the students in the group, the following are to be observed. Each one's Participation, Confidence in expression, Reacting to the expressed views (assent/refute) amiably and amicably, Relevance to the topic of discussion, Lead and conclude the topic of discussion (1 mark each) may be assessed and marks be awarded accordingly. Thus, a Batch of 30 Students can be examined within 3 hours. Listening 45 minutes, Speaking 90 Minutes, Writing maximum 45 Minutes. (180 Minutes)

Assignment Topics:**III. Guidelines for recording the material on the focused topics in the Record note.**

Write in the record note, **on any five topics**, from the list of topics given below.
(5 topics x 10 marks = 50 marks. Thus, the Average of 5 topics is 10 Marks)

10 Marks

NOTE:

5 students can form a group and choose any 5 topics under the guidance of the English Faculty and Google search and then present them in the class for interaction. Finally they have to be written as Assignments in the Record Note.

Of the 5 topics chosen, 1 topic should compulsorily be taken from the 11th to the 15th topic given below (which are specially the TOPICS ON GENDER SENSITISATION) and the rest of the 4 topics shall be chosen from the 1st to 10th topic given below.

Topics for Assignments:

1. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid
7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights
9. Entrepreneurship
10. Marketing Analysis, Support and Procurement
11. Important Constitutional and Legal Provisions For Women in India
12. The Harassment of Women at Workplace (Prevention and Prohibition & Redressal) Act,2013
13. Guidelines and Norms laid down by the Hon'ble Supreme Court in Vishaka and Others
14. The National Commission for Protection of Child Rights (NCPCR)
15. The Protection of Children from Sexual Offences (POCSO) Act & Rule of POCSO Rules,2012

LIFE AND EMPLOYABILITY SKILLS: QUESTION BANK**A. LISTENING****25 Marks**

1.	Listen to the content and take down notes/hints.	10 Marks
2.	Listen to the content and answer the following questions.	10 Marks
3.	Listen to the content and fill in the blanks with the exact words heard.	5 Marks

NOTE: Only topics related to pollution/environment/global warming are to be taken for listening section. The same matter / topic should not however be repeated in the above 3 listening activities.

B. SPEAKING**30 Marks**

1. Say in a sentence instantly on hearing the word (5 words must be given one after another) 5 Marks

NOTE: The examiners at the time of Practical Exam may provide Words which are commonly used in day to day life.

2. Say any 5 expressions commonly used in communication. 5 Marks

NOTE: Students are supposed to say 5 expressions reflecting Politeness / Courtesy / Etiquette / Mannerism / Request

3. Introducing Oneself/Others in Organisation. 5 Marks

QUESTIONS:

- Introduce yourself as a prospective candidate for the company while facing the interview.
- Imagine the General Manager from the Head Office of your company has come to inspect your factory. Introduce him.
- Imagine a Consultant has come to your department. Introduce him to your subordinates.
- New Factory Manager has been appointed. Introduce him to all the employees of your firm.
- Introduce yourself after joining the department/factory/company.

- Assume that the Inspector of Factories has come to check the quality of products and the safety standards adopted as per Govt. Norms and Regulations. Introduce him to the staff of all departments for their co- operation, in this regard.
- A Marketing Company Representative visits your factory to buy your product. Introduce him to your Supervisors.

4. Explain/Describe the Product/Machine/Department.

5 Marks

QUESTIONS:

- Explain/Describe the product, you are about to launch in the market.
- Describe the newly installed modern machine in your company which is purchased for the purpose of increasing the production.
- Explain the functioning and the efficiency of the machine that you have manufactured in your company.
- Illustrate the launch of new model car and its capabilities.
- Describe your department

5. Dialogue at the Place of Work.

5 Marks

QUESTIONS:

- As the Department Head, call the Supervisor and talk to him about the installation of the new machines in your factory.
- Talk to your colleague working in the factory about the safety standards to be implemented in your factory after the visit of Inspector of Factories.
- Speak to your colleague about the training you had at the Head Quarters and the outcome of the training in handling the latest machine installed in your factory.
- Call the Subordinate who is irregular and careless in his work. Advise him.
- Speak to your Higher Officer about the steps taken to stop the strike proposed by the workers of your factory.
- Speak with your immediate boss about the progress you have made.

6. Group Discussion

5 Marks

NOTE: Depending on the strength of the students in a Batch, they may be divided into groups of six/eight and be asked to discuss on anyone of the following topics given below.

QUESTIONS:

Discuss within the group on any one of the topics given below.

1. Productivity in Industries – comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First- Aid
7. Labour Welfare Legislation
8. Labour Welfare Acts and Rights
9. Entrepreneurship
10. Marketing Analysis, Support and Procurement
11. Global Warming
12. Environment
13. Pollution
14. Importance of Communication in English
15. Constitutional and Legal Provisions for Women in India
16. Harassment of Women at Workplace (Prevention & Prohibition, And Redressal) Act,2013
17. Guidelines & Norms laid down by Honourable Supreme Court in Vishaka and Others

18. National Commission for Protection of Child Rights (NCPCR)
19. Protection of Children from Sexual Offences Act & Rule 6 of POCSO Rules, 2012

C. WRITING & READING**20 Marks**

1. Frame new questions from the pattern given by changing sets of words with your own. 5 Marks
QUESTION:

When	do	you	return?
How	is	his performance?	
Where	has	the manager	gone?
What	is	the progress	today?
Why	are	the machines	not functioning?

Model answers. (Change of one set is sufficient in each of the sentences)

1. When do you come?
2. Where is his performance?
3. Where has the supervisor gone?
4. How is the progress today?
5. Why are the machines not working?

What	are	the methods	adopted?
When	is	the manager	coming?
Why	will	he	give?
Where	has	the product	gone?
How	do	you	perform?

Why	do	you	go?
Which	has	he	completed?
What	will be	the outcome?	
How	does	this	work?
Where	is	the progress?	

What	would be	the result?	
Whose product	has come out	recently?	
When	shall	the new product	be launched?
How	can we	overcome	this problem?
Who	is	the manager	in this factory?

On Whom	would you	put	the blame?
Who	shall be	responsible	for this?
What	do you	want to	convey?
When	can we	see	performance?
How	will you	solve	this problem?

When	do	they	award	the winners?
Why	don't	you	realise	your weakness?
Who	will make	him	responsible?	
What	do	you	want	coffee or tea?
Where	can	we	meet	him?

2. Make sentences from the pattern given by changing sets of words with your own. 5 Marks

QUESTION:

The workers	are	on strike.	
The labourers	are paid	well	in this factory.
There	is	a rest room	for the workers.
These	are	the new products	launched.
Almost everyone	came	to the company	on motorbikes.

Model answers. (Change of one set is sufficient in each of the sentences)

1. The engineers are on strike.
2. The labourers are paid less in this factory.
3. There is a rest room for the women staff.
4. These are the new products introduced.
5. No one came to the company on motorbikes.

We	work	for the society.	
They	introduce	new techniques	for efficiency.
Wearing	helmets	is	compulsory.
Our company	announces	bonus	for the employees.
Labour laws	are followed	strictly	in our company

The Supervisor	enquired	the workers.	
The industry	is shut	for May Day.	
New methods	are introduced	in the company.	
Gopi	works	in the first shift.	
We	manufacture	bolts & nuts.	

The workers	are	the assets	of this factory.
The welfare	of the employees	is looked after.	
Safety	is	the first priority	for any company.
Labour welfare laws	are	strictly	followed.
I	take	pride	to work here.

He	was promoted	as G.M	yesterday.
My life	has been	wonderful	here.
These	will be	my targets.	
They	are	in the canteen	now.
We	have	a bike stand	near the gate.

The doctor	is	on duty.	
Edison	was	a great scientist.	
There	were	many trees	in our village.
Our teachers	give	us	useful guidance.
Most children	go	to school	by vans.

3. Prepare a resume.

5 Marks

QUESTIONS:

- Prepare a resume for the post of Department Manager.
- Write a resume for the post of Programme Trainee in a software firm.
- Prepare a resume for the post of Site Supervisor in a Tower Erection company.
- Prepare a resume for the post of Senior Sales Manager, in an organisation.
- Write a resume for the post of Site Engineer in a company.
- Prepare a resume for the post of Lecturer in a Polytechnic College.

4. Prepare an outline of a Project.

5 Marks

QUESTIONS:

- Prepare an outline of a Project to obtain a loan. (Provide only headings and subheadings)
- Prepare an outline of a Project to start a factory with your own funds. (Provide only headings and subheadings)
- Prepare an outline of a Project to start a Retail Selling Showroom with your friends as partners. (Provide headings and subheadings only)
- Prepare an outline of a Project so as to start a factory on Job-work Basis from the order you can get from a big company. (Provide only headings and subheadings)

LIFE AND EMPLOYABILITY SKILLS PRACTICAL

Time: 3 Hours

Maximum Marks: 75

Name:
Register Number:

Date:
Time:

A. LISTENING (25 Marks)	
1. Listen to the content and take down notes/hints	10
2. Listen to the content and answer the following questions.	10
3. Listen to the content and fill in the blanks the exact words heard.	05
B. SPEAKING (30 Marks)	
1. Say in a sentence instantly on hearing the word (5 words, one after another).	05
2. Say any five expressions commonly used in communication.	05
3. Imagine, a consultant has come to your department. Introduce him to your subordinates.	05
4. Explain/describe the product you are about to launch in the market.	05
5. Speak with your immediate boss about the progress you have made.	05
6. Discuss within the group on the topic of focus prescribed in the syllabus.	05

C. WRITING & READING (20 Marks)

1. Frame new questions from the pattern given by changing sets of words with your own. 05

a.	When	do	you	return?
b.	How	is	his performance?	
c.	Where	has	the manager	gone?
d.	What	is	the progress	today?
e.	Why	are	the machines	not functioning?

2. Make sentences from the pattern given by changing sets of words with your own. 05

a.	The workers	are	on strike.		
b.	The labourers	are paid	well	in this factory.	
c.	There	is	a rest room	for the workers.	
d.	These	are	the new	launched	by our company.
e.	Almost	came	to the company	on motorbikes.	

3. Prepare a resume for the post of Department Manager. 05
4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

Signature of the Candidate

DETAILED ALLOCATION OF MARKS: (75 MARKS)

ACTIVITY	MARKS						TOTAL MARKS
	A.1 (10)		A.2 (10)		A.3 (05)		
PART – A LISTENING							
PART – B SPEAKING	B.1 (05)	B.2 (05)	B.3 (05)	B.4 (05)	B.5 (05)	B.6 (05)	
PART – C WRITING & READING	C.1 (05)		C.2 (05)		C.3 (05)		
GRAND TOTAL							

Signature of the Internal Examiner

Signature of the External Examiner

Theory & writing exercises	50 Hours
Revision / Repetition	10 Hours
Total	60 Hours

SIXTH SEMESTER
R5-611 CONSTRUCTION MANAGEMENT WITH MIS

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-611 CONSTRUCTION MANAGEMENT WITH MIS	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	CONSTRUCTION SECTOR IN INDIA, FEASIBILITY STUDY, PLANNING OF CIVIL ENGINEERING PROJECT AND CONTRACT MANAGEMENT	13
II	CONSTRUCTION ORGANISATION AND THEIR SUPERINTENDENCE & DEPARTMENTAL PROCEDURE AND ACCOUNTING	13
III	SCHEDULING AND TIME MANAGEMENT & RESOURCE MANAGEMENT	13
IV	QUALITY MANAGEMENT AND SAFETY, CONSTRUCTION DISPUTES AND THEIR SETTLEMENT CONSTRUCTION LABOUR AND LEGISLATION & ETHICS IN ENGINEERING	13
V	ENTREPRENEURSHIP, INFORMATION MANAGEMENT AND COMPUTERS AND FINANCIAL MANAGEMENT	13
Total Instruction Hours		65

UNIT - I**CONSTRUCTION SECTOR IN INDIA, FEASIBILITY STUDY, PLANNING OF CIVIL ENGINEERING PROJECT AND CONTRACT MANAGEMENT****13 Hrs**

Construction Sector in India: Construction management – definition – need – scope – objectives and & functions – role of Government and private construction agencies – types of construction sectors – public and private functions of construction management in national development – construction practice:-the owner, consultant and contractor – duties and responsibilities – various stages of a construction project

Feasibility Study: Study of necessity of project – technical feasibility, financial feasibility, ecological feasibility, resource feasibility, recovery from the project, economical analysis – building economics – preliminary studies – analysis – valuation.

Planning of Civil Engineering Project: Objective of planning – public project – preliminary planning – design factors – site utilization – reconnaissance survey – preliminary survey – analysis and plotting of data – estimate: preliminary and detailed estimate – project report – land acquisition – administrative approval – technical sanction – budget provision – private project – advantages of planning to client and engineer – limitations – stages of planning by owner and contractor

Contract Management: Types of contracts – contract documents – contractual obligations – specifications – tender notice – types – tender documents – Earnest Money Deposit (EMD) and Security Deposits (SD) – scrutiny and acceptance of a tender – contract agreement – contractual changes and termination of contract – work order – execution of agreement – sub contract – rights and duties of sub-contractor

UNIT - II**CONSTRUCTION ORGANISATION AND THEIR SUPERINTENDENCE & DEPARTMENTAL PROCEDURE AND ACCOUNTING****13 Hrs**

Construction Organisations and Their Superintendence: Forms of business organizations – sole proprietorship – partnership – joint stock company – co-operative society – and state enterprises – advantages and disadvantages – delegation of responsibility, personnel requirements and division of works – decentralization – construction supervision and superintendence – requirements and responsibilities of executives of the project – qualities of efficient construction manager – pay rolls and records – purchase and delivery of construction materials and equipments – percentage completion report – insurance record – project office requirement – organisation chart of a small / medium / large construction company (broad outline only).

Departmental Procedure and Accounting: Organisation of PWD – responsibilities of officers – accounting procedure (administrative sanctions, technical sanctions and payment of bills) – imprest and temporary accounts – cash book – works register – accounting for consumable materials – record for tools and plants – importance of m-book and its entries – work charged establishment – Nominal Muster Roll (NMR) – Daily Labour Reports (DLR)

UNIT - III**SCHEDULING AND TIME MANAGEMENT & RESOURCE MANAGEMENT****13 Hrs**

Scheduling and Time Management: scheduling – definition – preparation of schedule – uses and advantages – classification of schedules – methods of scheduling – bar chart – job layout – Work Breakdown Chart (WBC) – network for projects management – activity – event – dummies – basic assumptions in creating a network – rules for developing

networks – Fulckerson’s rule for numbering the events – critical path method critical and subcritical paths – critical and non critical activities / events – significance of critical path – simple problems - PERT – time estimate – EST, EFT, LST, LFT- earliest expected time – latest allowable occurrence time – floats – slack. Standard deviation – variance – simple problems

Resource Management: definition – need for resource management – optimum utilization of resources-finance, materials, machinery, human resources – resource planning – resource levelling and its objectives – construction planning – stages – operations – schedule – crashing – need for crashing an activity – methods and tips for crashing – time vs cost optimization curve – cost slope and its significance in crashing – simple problem on resource levelling (not for examination)

UNIT - IV

QUALITY MANAGEMENT AND SAFETY, CONSTRUCTION DISPUTES AND THEIR SETTLEMENT CONSTRUCTION LABOUR AND LEGISLATION & ETHICS IN ENGINEERING 13 Hrs

Quality Management and Safety: Importance of quality – elements of quality – quality assurance techniques (inspection, testing, sampling) importance of safety – causes of accidents – role of various parties (designer / employer / worker) in safety management – benefits – approaches to improve safety in construction

Construction Disputes and Their Settlement: Introduction – development of disputes – categories of disputes – modes of settlements – arbitration

Construction Labour and Legistation: Need for legislation – Payment of wages Act – Factories Act – Contract labour (Regulation and abolition) Act – Employees Provident Fund (EPF) Act

Ethics in Engineering: Human values – definition of ethics – engineering ethics – engineering as a profession – qualities of professional – professional institutions – code of ethics – major ethical issues – ethical judgment – engineering and management decision – value based ethics

UNIT - V

ENTREPRENEURSHIP, INFORMATION MANAGEMENT AND COMPUTERS AND FINANCIAL MANAGEMENT 13 Hrs

Entrepreneurship: Definition – role and significance – risks and rewards – concepts of entrepreneurship – profile and requirement of entrepreneur – programmes existing in India – SSI, DIC, TANSIDCO – funding and technical assistance to entrepreneurship – NIDCO, ICICI, IDBI, IFCI, SFC

Information Management and Computers: Introduction – definition of MIS – Outline of MIS – use of computers in construction industry – requirements of MIS – a data base approach – definition – benefits – a data base approach to contractor’s account and its advantage – basic concepts of estimation – project management and operations simulation packages – construction automation and robotics

Financial Management: Elements of cash flow – time value of money – interest rate of capital – present value computation – NPV method – IRR method – simple problems – Global banking culture – types of banks – activities of banks – corporate finance – personal, retail and rural banking – treasury management.

Text Books:

1. Sanga Reddy. S, “Construction Management”,Kumaran Publications, Coimbatore.
2. Rangwala.S.C.,”Construction of Structures and Management of Works” Charotar Publishing House, Anand 388 001, 2000

Reference Books:

1. Sengupta.B, &H.Guha. "Construction Management and Planning ",Tata McGraw Hill, New Delhi
2. Seetharaman. S, " Construction Engineering & Management ",Umesh Publications, New Delhi
3. Boyd.C. & Paulson Jr, "Computer Applications in Construction ",Tata McGraw Hill, New Delhi.
4. B C Punmia, " Project Planning and control with PERT and CPM", Laxmi Publications.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-612 HYDRAULICS

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-612 HYDRAULICS	6 Hrs	90 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	INTRODUCTION, MEASUREMENT OF PRESSURE AND HYDROSTATIC PRESSURE ON SURFACES	16
II	FLOW OF FLUIDS, FLOW THROUGH ORIFICES AND MOUTHPIECES AND FLOW THROUGH PIPES	16
III	FLOW THROUGH NOTCHES AND FLOW THROUGH WEIRS	16
IV	FLOW THROUGH OPEN CHANNELS	16
V	GROUND WATER PUMPS	16
Total Instruction Hours		80

UNIT - I

INTRODUCTION, MEASUREMENT OF PRESSURE AND HYDROSTATIC PRESSURE ON SURFACES

16 Hrs

Introduction: Hydraulics – Definition – properties of fluids – mass, force, weight, specific volume, specific gravity, specific weight, density, relative density, compressibility, viscosity, cohesion, adhesion, capillarity and surface tension – dimensions and units for area, volume, specific volume, velocity, acceleration, density, discharge, force, pressure and power

Measurement of Pressure: Pressure of liquid at a point – intensity of pressure – pressure head of liquid – conversion from intensity of pressure to pressure head and vice-versa – formula and simple problems – types of pressures – static pressure,

atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure – simple problems – measurement of pressure – simple mercury barometer – pressure measuring devices – piezometer tube – simple U-tube manometer – differential manometer – micrometer – simple problems

Hydrostatic Pressure on Surfaces: Pressure on plane surfaces – horizontal, vertical and inclined surfaces – total pressure – centre of pressure – depth of centre of pressure – resultant pressure – simple problems on practical application – sluice gates, lock gates and dams – descriptions

UNIT - II

FLOW OF FLUIDS, FLOW THROUGH ORIFICES AND MOUTHPIECES AND FLOW THROUGH PIPES 16 Hrs

Flow of Fluids: Types of flow – laminar and turbulent flow – steady and unsteady flow – uniform and non-uniform flow – equation for continuity of flow (law of conservation of mass) – energy possessed by a fluid body – potential energy and potential head – pressure energy and pressure head – kinetic energy and kinetic head – total energy and total Head – Bernoulli's theorem – (no proof) – problems on practical applications of Bernoulli's theorem – venturimeter – orificemeter (derivation not necessary) – simple problems

Flow Through Orifices and Mouthpieces: Definitions – types of orifices – vena-contracta and its significance – hydraulic co-efficients C_d , C_v and C_c – formula – simple problems – large orifice – definition – discharge formula – simple problems – practical applications of orifices – types of mouthpieces – external and internal mouthpieces – discharge formula – simple problems

Flows Through Pipes: Definition of pipe – losses of head in pipes – major losses – minor losses – sudden enlargement, sudden contraction, obstruction in pipes (no proof) – simple problems – energy / head losses of flowing fluid due to friction – Darcy's equation – Chezy's equation (no derivation) – problems – transmission of power through pipes – efficiency – pipes in parallel connected to reservoir – discharge formula – simple problems

UNIT - III

FLOW THROUGH NOTCHES AND FLOW THROUGH WEIRS 16 Hrs

Flow Through Notches: Definitions – types of notches – rectangular, triangular and trapezoidal notches – derivation of equations for discharge – simple problems – comparison of V-notch and rectangular notch

Flow Through Weirs: Definitions – classification of weirs – discharge over a rectangular weir and trapezoidal weir – derivation – simple problems – end contractions of a weir – Franci's and Bazin's formula – simple problems – Cippoletti weir – problems – narrow crested weir – sharp crested weir with free over fall – broad crested weir – drowned or submerged weirs – suppressed weir – stepped weir – simple problems – definition of terms – crest of sill, nappe or vein, free discharge – velocity of approach – spillways and siphon spillway – definition

UNIT - IV

FLOW THROUGH OPEN CHANNELS 16 Hrs

Definition – Classification – rectangular and trapezoidal channels – discharge – Chezy's formula, Bazin's formula and Manning's formula – hydraulic mean depth – problems – conditions of rectangular / trapezoidal sections – specific energy, critical depth – conditions of maximum discharge and maximum velocity – simple problems – flow in a

venturiflume – uniform flow in channels – flow through a sluice gate –types of channels – typical cross-sections of irrigation canals – methods of measurements of velocities – channel losses – lining of canals – advantages of lining of canals – types of lining – cement concrete lining with sketches – soil cement lining with sketches – LDPE lining

UNIT - V**GROUND WATER PUMPS****16 Hrs**

Ground Water: Aquifer – water table – exploring the availability of ground water – tapping of ground water – open well – bore well – types of well construction – yield of a open well – equation – specific capacity or specific yield of a well – test for yield of well – methods of rain water harvesting – sanitary protections (theory only)

Pumps: Pumps – Definition – difference between a pump and a turbine – classification of pumps – positive displacement pumps and roto-dynamic pressure pumps – characteristics of modern pumps – maximum recommended suction lift and power consumed – reciprocating pump – construction detail and working principle – types – single acting and double acting – slip – air vessels – discharge and efficiency – simple problems – centrifugal pump – advantages and disadvantages over a reciprocating pump – layout –construction details – priming of centrifugal pump – working of the pump – classification – functions of foot valve, delivery valve and non-return valve – fundamental equation of centrifugal pump – characteristics of a centrifugal pump – discharge, power and efficiency – simple problems – specifications of centrifugal pumps and their sections – hand pump – jet pump – deep well pump – plunger pumps – piping system

Text Books:

1. K.L.Kumar – Fluid Mechanics – Eurasia Publishing House – New Delhi
2. R.K. Bansal – Fluid Mechanics – Lakshmi Publications

Reference Books:

1. Dr. Jagadish Lal – Hydraulics, Fluid Mechanics and Hydraulic Machines–Metropolitan Book Company– New Delhi
2. P.N. Modi & S.M. Sethi – Fluid Mechanics – Standard Publishers – New Delhi
3. S. Ramamirtham – Hydraulics, Fluid Mechanics and Hydraulics Machines– Dhanpat Rai & Sons New Delhi
4. Prof. S. Nagarathinam – Fluid Mechanics – Khanna Publishers – New Delhi
5. K.R. Arora – Hydraulics, Fluid Mechanics and Hydraulics Machines – Standard Publishers.
6. B C S Rao, “Fluid Mechanics and Machinery” Tata–McGraw–Hill Pvt. Ltd., New Delhi

Instruction Hours	80 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	90 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-613.1 ELECTIVE THEORY - II STEEL STRUCTURES

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-613.1 STEEL STRUCTURES	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	INTRODUCTION TO PLASTIC ANALYSIS AND LSD	13
II	DESIGN OF TENSION AND COMPRESSION MEMBERS BY LSM	13
III	DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY LSM	13
IV	DESIGN OF SECTIONS FOR COMBINED ACTIONS	13
V	DESIGN OF CONNECTIONS AND DETAILING	13
Total Instruction Hours		65

UNIT - I**INTRODUCTION TO PLASTIC ANALYSIS AND LIMIT STATE DESIGN****13 Hrs**

Plastic Analysis: Analysis of steel structures – methods – elastic, plastic and dynamic analysis and advanced method of analysis based on IS:800-2007 – idealized stress vs strain curve for structural steel – requirements and assumptions of plastic method of analysis – formation of plastic hinges in flexural members – plastic moment of resistance and plastic modulus of sections – shape factors of rectangular / circular / I / T-sections – collapse load – determination of collapse loads for cantilever, simply supported and fixed beams by any (statical or kinematical method) – simple problems

Limit State Design: Advantages of limit state design of steel structures – basis for design – classification of limit states – characteristic and design actions – ultimate and design strengths – partial safety factors for loads and materials – design requirements – strength requirements: stability, fatigue and plastic collapse – serviceability requirements: deflection limits, vibration, durability and fire resistance – geometrical properties of gross and effective cross sections – classification of cross sections as per IS:800-2007 – internal, external (outstands) and tapered elements of sections – maximum effective slenderness ratio of members – necessity of bracings and expansion joints in steel structures

UNIT - II**DESIGN OF TENSION AND COMPRESSION MEMBERS BY LSM****13 Hrs**

Tension Members: Design strength of tension members against yielding of gross section, against rupture of critical section and due to block shear – design requirements – problems on determination of design strength of given members and designing tension members using rolled steel sections for given loads – design of bolted and welded connections for tension members – simple problems

Compression Members: Effective length and effective sectional area of compression members – design stress and design strength – buckling class of cross sections – imperfection factor – stress reduction factor – thickness of elements – eccentricity of loads on columns – single angle and double angle struts – bolted and welded connections for struts – design of built up columns – connecting the components of built up columns by tacking bolts / welds – requirements of connections – laced columns – single and double laced systems – requirements of lacing bars – design of lacings – battened columns – requirements of battens – design of battens – simple problems

Column Bases: Slab base and gusseted base – code provisions (IS:800-2007) – minimum thickness and effective area of base plate – design of slab base and gusseted base for axially loaded columns using bolts / welds

UNIT - III

DESIGN OF FLEXURAL MEMBERS FOR BM AND SF BY LSM

13 Hrs

Laterally Supported Beams: Classification of steel beams – effective span – design principles – web buckling and web crippling – minimum thickness of web – sections with webs susceptible /not susceptible to buckling under shear before yielding – design bending strength of sections with low shear – effect of holes in tension zone – nominal shear strength and design shear strength of sections – limiting deflection of beams – design of laterally supported simple beams for bending moment and shear force using single / double rolled steel sections (symmetrical cross sections only) – problems – unsymmetrical (bi-axial) bending – design of laterally supported purlins for sloped roof trusses (for given vertical UDL with BM coefficient 0.085) – simple problems

Laterally Un-Supported Beams: Lateral torsional buckling of compression flange – maximum permitted slenderness ratio of compression flange – design bending strength of laterally unsupported beams – bending stress reduction factor – imperfection parameter – elastic lateral buckling moment of doubly symmetric sections – end torsional restraints and intermittent bracing of compression flange – requirements, types and their effects – design of laterally unsupported beams for bending and shear using symmetrical rolled steel sections – simple problems

UNIT - IV

DESIGN OF SECTIONS FOR COMBINED ACTIONS

13 Hrs

Sections Subjected to Bending Moment and High Shear force: Effect of high shear on flexural capacity of sections – limiting value of shear force for full moment capacity of sections – reduced design strength of plastic / compact / semi compact sections subjected to high shear – design of support sections of cantilevers and continuous beams – simple problems

Sections Subjected to Bending Moment and Axial Compression (Beam-Column): Columns carrying eccentric loads, columns subjected to vertical and horizontal loads (wind loads), columns of frames, principal rafters with purlins at non-nodal points – material failure and buckling failure – interaction equations – overall buckling – simple design problems (with axial compression and uni-axial BM only)

Sections subjected to Bending moment and Axial Tension: Bottom chord members of bridge girders – tie members of trusses with hanging loads – reduced effective moment – interaction equations – simple design problems

UNIT - V

DESIGN OF CONNECTIONS AND DETAILING

13 Hrs

General: Types of connections – bolted, riveted and welded connections – rigid and flexible connections – components of connections – basic requirements of connections – clearance for holes – minimum and maximum spacing of fasteners – minimum edge / end distances – requirements of tacking fasteners

Bolted Connection: Types of bolts – bearing type bolts – nominal and design shear strengths of bolts – reduction factors for long joints, large grip lengths, thick packing plates – nominal and design bearing strengths of bolts – reduction factors for over sized and slotted holes – nominal and design tensile strengths (tension capacity) of bolts – friction grip type bolts – advantages – requirements as per IS:3757– nominal and design

slip resistance of bolts in shear – slip factors – nominal and design tensile strengths of friction bolts – simple design problems (combined actions not included)

Welded Connection: Types of welds – fillet welds – minimum and maximum sizes – effective length of weld – fillet welds on inclined faces – design strengths of shop/site welds – butt welds – effective throat thickness and effective length of butt weld – strength of butt weld – intermittent welds – slot or plug welds – reduction factor for long joints – stress in the weld due to individual forces – design requirements of connections – simple design problems (combined actions not included)

Detailing: Beam to beam and beam to column connections – seat angle and web angle connections – designing and detailing of simple connections for vertical forces (moment resisting connections are not included) – simple problems – connection details of truss members at joints (neat sketches)

Text Books:

1. M.R.Shiyekar“Limit State Design in Structural Steel”, PHI Learning Pvt Ltd, 2011
2. K.S.Sai Ram“Design of Steel Structures” Pearson-Prentice Hall Kindersley Pvt Ltd

Reference Books:

1. Dr.N.Subramanian “Steel Structures”
2. IS:800-2007 ,Code of practice for General construction in steel

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-613.2 ELECTIVE THEORY - II TOWN PLANNING

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-613.2 TOWN PLANNING	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	TOWN PLANNING PRINCIPLES, SURVEYS AND ZONING	13
II	HOUSING AND SLUMS	13
III	PUBLIC BUILDINGS, PARKS AND PLAY GROUNDS, MASTER PLAN AND RE-PLANNING EXISTING TOWNS	13
IV	URBAN ROADS AND TRAFFIC MANAGEMENT	13
V	BUILDING BYE-LAWS AND MISCELLANEOUS TOPICS	13
Total Instruction Hours		65

UNIT - I**TOWN PLANNING PRINCIPLES, SURVEYS AND ZONING****13 Hrs**

Town Planning Principles: General – evolution of planning – objects of town planning – economic justification for town planning – principles of town planning – necessity of town planning – origin of towns – growth of towns – stages in town development – personality of town – distribution of land – form of planning – site for an ideal town – requirements of new towns – planning of a modern town – powers required for enforcement of town planning scheme – cost of town planning – present position of town planning in India

Surveys: General – necessity – collection of data – types of surveys for planning a new town – uses of surveys

Zoning: Meaning of the term – uses of land, objects and principles of zoning – advantages of zoning – importance of zoning – aspects of zoning – transition zone – economy of zoning – Special Economic Zone (SEZ) – zoning powers – maps for zoning

UNIT - II**HOUSING AND SLUMS****13 Hrs**

Housing: General – importance of housing – demand for houses – building site – requirements of residential buildings – classification of residential buildings – design of residential areas – rural housing – agencies for housing – investment in housing – HUDCO – CIDCO – housing problems in India

Slums: General – causes of slums – characteristics of slums – effects of slums – slum clearance – problems in removing slums – improvement works – open plot scheme – slum clearance and rehousing – prevention of slum formation – resources for slum clearance programmes – the Indian slums

UNIT - III**PUBLIC BUILDINGS, PARKS AND PLAY GROUNDS, MASTER PLAN AND RE-PLANNING EXISTING TOWNS****13 Hrs**

Public Buildings: General – suitable location of public buildings – classification of public buildings – principles of design of public buildings – town centers – grouping of public buildings – requirements of public buildings – green house – civic aesthetics

Parks and Play Grounds: General – types of recreation – necessity of open spaces – location of urban green spaces – classification of parks – park systems – park design – finance for parks – parkways – playgrounds – space standards – landscape architecture

Master Plan: General – objects – necessity – factors to be considered – data to be collected – drawings to be prepared – features of master plan – planning standards – report – stages of preparation – method of execution – Conclusion

Re-planning Existing Towns: General – objects of re-planning – analyzing the defects of existing towns – data to be collected – difficulties in master planning existing towns / cities – urban renewal projects – merging of suburban areas – decentralization – satellite towns – smart cities – definition and features – surface drains – refuses of towns – refuse disposal methods

UNIT - IV**URBAN ROADS AND TRAFFIC MANAGEMENT****13 Hrs**

Urban Roads: General – objects – requirements of good city road – factors to be considered – classification of urban roads – types of street systems – through and

by-pass roads – outer and inner ring roads – expressways – freeways – precincts – road aesthetics

Traffic Management: General – object – traffic survey – traffic congestion – traffic control – traffic diversion – road junction – parking – traffic capacity of road – one way traffic – road traffic problems – use of islands and flyovers at crossings – causes of road accidents – traffic signal – advantages and disadvantages of automatic light signals – road sign – road marking – name boards of streets – direction boards – street lighting in a town – traffic problem of existing towns – peculiarities of traffic

UNIT - V

BUILDING BYE-LAWS AND MISCELLANEOUS TOPICS

13 Hrs

Building Bye-laws: General – objects of bye – laws – importance of bye – laws – function of local authority – responsibility of owner – applicability of bye-laws – set backs to buildings – necessity of setbacks – light plane – plot coverage – floor space index – maximum height of buildings – off-street parking – fire protection – minimum width of streets and plot sizes – some other terms – principles underlying in framing building bye – laws – building bye-laws for residential area of a typical town planning scheme – building bye-laws for other types of buildings – development control rules – general rules of metropolitan area – CMDA rules

Miscellaneous Topics: Airports – location – size – noise control – parts of an airports – betterment and compensation – city blocks – conurbations – cul-de-sac streets – focal point – green belt – public utility services – rapid transit – remote sensing application – urban planning using remote sensing – site suitability analysis location of bus terminus, whole sale markets, exhibition centers etc., – location for water / sewage treatment plants, location for waste disposal etc., – transportation planning

Text Books:

1. K.S.Rangwala and P.S.Rangwala,. 'Town Planning ',Charotar Publishing House,15th Edition,1999.
2. Town Planning – S.C. Rangwala,: Charotar Publisher (2011), Publisher

Reference Books:

1. K.S.Rangwala and P.S.Rangwala,. 'Town Planning',Charotar Publishing House,15th Edition,1999.
2. National Building Code of India– Part-III.(2005).
3. Municipal and Panchayat bye-laws, CMDA Rules and Corporation byelaws.
4. KA. Ramegowda, Urban and regional planning , University of Mysore
5. Principles and practice of town and country planning Lewis B. Keeble, Estates Gazette, University of Michigan,2010

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-613.3 ELECTIVE THEORY - II EARTHQUAKE ENGINEERING

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-613.3 EARTHQUAKE ENGINEERING	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	ENGINEERING SEISMOLOGY AND STRUCTURAL DYNAMICS	13
II	EARTHQUAKE RESISTANT CONSTRUCTION USING BIS 4326	13
III	EARTHQUAKE RESISTANT DESIGN AS PER BIS 1893	13
IV	CONCEPT OF EARTHQUAKE DESIGN	13
V	PREDICTION OF EARTHQUAKES, SEISMIC CAPACITY EVALUATION AND STRENGTHENING & SHEAR WALL AND DAMPERS	13
Total Instruction Hours		65

UNIT - I**ENGINEERING SEISMOLOGY AND STRUCTURAL DYNAMICS****13 Hrs**

Engineering Seismology: earthquake – causes and origin – theory of plate tectonics convergent boundary – divergent boundary – transform boundary – seismic waves – place of occurrence of earthquakes in world – world's great earthquakes – major Indian earthquakes – intensity of earthquake – Mercalli scale – MM scale – MSK scale – magnitude of earthquakes – Richter's scale – Bhuj earthquake: Dec 2004 – Tsunami – Tsunami causes effects – seismology of few earthquakes – seismological report of some earthquakes

Structural Dynamics: Definition of dynamic force – nature of earthquake forces – acceleration due to earthquake – components – forces on structure – ground motion – idealization of structure into single degree freedom system – multi degree system – dynamic equilibrium equation – mass damping and stiffness of structure – natural period – frequency – modes of vibration – simple problems to find natural frequency and natural period of structures up to 5 stories – free vibration – forced vibration – damped and undamped vibration – numerical problem – concept of response spectrum – simple problem

UNIT - II**EARTHQUAKE RESISTANT CONSTRUCTION USING BIS 4326****13 Hrs**

Principles of construction – effect of mass of structure – preferable plan shape – specification on width of opening – strengthening doors windows – types of foundation – suitability of soil – quality of construction and workmanship – bond – horizontal band – continuous lintel – sill band – vertical bands – through stone – avoiding long wall – lightness in construction – performance of masonry wall during earthquake – strengthening mud walled construction. Report of past earthquakes (Bhuj earthquake, South Asia earthquake, Chile earthquake, Kobe earthquake, Kashmir earthquake 2005)

UNIT - III**EARTHQUAKE RESISTANT DESIGN AS PER BIS: 1893****13 Hrs**

Seismic zones – evaluation of lateral loads due to earthquake on RC framed structure using response spectrum method – centre of stiffness – drift – torsion – techniques to avoid torsion in structures – portal method for analysis of structure due to lateral load – load combination – calculation of forces on shear wall – numerical problems – analysis of portal frame for UDL and horizontal joint load using slope deflection methods and moment distribution methods – theoretical procedures only

UNIT - IV**CONCEPT OF EARTHQUAKE DESIGN****13 Hrs**

Cyclic load and hysteresis curve – ductility – performance of structure with good ductility – requirements of ductile beam and column – confinement of concrete – load shear and moment reversal during earthquakes – liquefaction – column hinge formation – open ground storey problem – determination of critical BM and SF for various load combinations at critical section of beam and column of portal frame (given analysis results of LL, DL and EQL) - theoretical procedures only

UNIT - V**PREDICTION OF EARTHQUAKES, SEISMIC CAPACITY EVALUATION AND STRENGTHENING & SHEAR WALL AND DAMPERS****13 Hrs**

Prediction of Earthquakes: Prediction of earthquakes methods – application of GIS in prediction of earthquake – major faults initializing a quake – fore shock seismograph – graph obtained and interpretation

Seismic Capacity Evaluation and Strengthening: Seismic capacity evaluation and strengthening of existing buildings – check list of points seismic strengthening of existing structures – procedures

Shear Wall and Dampers: Shear wall and dampers and its performance during earthquake – TMD, viscous dampers – structure on rollers

Text Books:

1. Earthquake Resistant Design of Structures by Pankaj Agarwal and Manish Shrikhande (2010) PHI Learning Pvt Ltd
2. Robert W.Day, "Geotechnical Earthquakes Engg. Hand Book, Tata McGraw–Hill, New Delhi, 2002

Reference Books:

1. Guidelines for Earthquake Resistant Non Engineered Construction by The Associated Cement Co.Ltd
2. Criteria for Earthquake Resistant Design of Structures –Provisions & Buildings,IS:1893 (Part 1) – 2002
3. Code of practice for ductile detailing of RC structures subjected to Seismic forces, IS:13920–1993.
4. Earthquake Tips by C.V.R.Murty, IIT, Kanpur, Sponsored by BMTPC, New Delhi.
5. Geotechnical Earthquake Engineering Hand Book by Robert W.Day – McGRAW – HILL
6. Introduction to Earthquake Engineering by Shunzo Okamoto – University of Tokyo Press
7. Repair and Seismic strengthening of buildings – Guidelines, IS:13935 – 2002
3. Dr Kamalesh Kumar, "Basic Geotechnical Earthquake Engineering", New Age International Publications, New Delhi, 2009

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-613.4 ELECTIVE THEORY - II BUILDING SERVICES

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
	R5-613.4 BUILDING SERVICES	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total
25				75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	ELECTRICAL SERVICES AND ELECTRICAL LAYOUT	13
II	MECHANICAL SERVICES AND AIR-CONDITIONING	13
III	LIGHTING AND VENTILATION	13
IV	FIRE-PROTECTION, ACOUSTICS AND SOUND INSULATIONS	13
V	MAINTENANCE OF BUILDINGS, DEFECTS AND REPAIR WORKS IN BUILDINGS	13
Total Instruction Hours		65

UNIT - I**ELECTRICAL SERVICES AND ELECTRICAL LAYOUT****13 Hrs**

Electrical Services: Conventional symbols for electrical installations – main – submain – wiring accessories – wire, cable, switches, wall plugs, fuses and cutouts – HRC type, round type, cartridge type – distribution boxes, circuit breaker, junction boxes – 2 pin and 3 pin sockets, lamp holder, ceiling roses, change over switches – various systems of wiring – wooden casing wiring, cleat wiring, CTS wiring, conduit wiring – insulation – earthing – electrical meters – use of generators, inverters, emergency lamps

Electrical Layout: Planning of electrical installations and distribution – preparation of electrical layout for a small residence, small work shop, show room, school building etc – estimation of load

UNIT - II**MECHANICAL SERVICES AND AIR-CONDITIONING****13 Hrs**

Mechanical Services: Lifts – definition – location – sizes – component parts – lift well, travel, pit, hoist way, machine, buffer, door locks – suspended rope, lift car, landing door, call indicator, call push – different types of elevators – freight elevators, passengers elevators, hospital elevators – dumbwaiters and vertical conveyors – escalators – locations and functions – advantages of escalators.

Air Conditioning: Definition – purpose – principles – temperature control, air velocity control. humidity control – air conditioning systems – component parts – air pumps, air delivery system, air distribution system – cleaners – filters, spray washers, electric precipitators – types of air conditioners – central type – window type – split unit

UNIT - III**LIGHTING AND VENTILATION****13 Hrs**

Lighting: Natural and artificial lighting – requirements of good lighting – day light factors – day light penetration – aims of good lighting – general principles of openings to afford good lighting – reflection factors – illumination – units of measurement – Lux, Candela, luminous flux – orientation of buildings – external reflected component – internal

reflected component – necessity of artificial lighting – arrangement of luminaries – distribution of illumination – utilization factor – temperature rise due to artificial lighting – remedial measures

Ventilation: Definition – necessity – types – natural / mechanical ventilation – wind effect – factors to be considered in the design of ventilation – respiration, vitiation of air, air changes, and heat balance of body – general rules for natural ventilation – advantages and disadvantages of mechanical ventilation – methods of mechanical ventilation – combined systems

UNIT - IV

FIRE PROTECTION, ACOUSTICS AND SOUND INSULATIONS

13 Hrs

FIRE PROTECTION: Causes and effects of fire – precautionary measures – factors to be considered for limiting fire spread area – characteristics of fire resisting materials – general requirements for fire resisting – fire protection systems – fire exits – general requirements as per NBC 2005 – maximum travel distance – horizontal exit, roof exit / fire lifts, external stairs – fire fighting installations

Acoustics and Sound Insulations: Acoustics of buildings – characteristics of sound – pitch or frequency, intensity, tone – measurement of intensity of Bel & decibel – behavior of sound and its effects – transmission, reflection, absorption – echoes, reverberation – common acoustical defects – requirements of good acoustics – principles and factors to be considered in acoustical designs – sound absorbents – types – absorption coefficients – sound insulation of buildings – general factors to be considered and constructional measures to be followed for noise control in residential buildings

UNIT - V

MAINTENANCE OF BUILDINGS, DEFECTS & REPAIR WORKS IN BUILDINGS 13 Hrs

Maintenance of Buildings: Introduction – maintenance works in buildings – painting – flooring – sinking of floors – doors and windows – termite attack – sanitary appliances – water supply and drainage system – leakages – cracks in concrete – types – cracks in walls – types – common methods of crack repair – preventive maintenance – corrosion of steel elements – special precautions for repairs of building

Defects and Repair Works in Buildings: Defects in buildings – prevention of defects in buildings – major causes of defects – treatment of toilet sunken portion – improper laying of weathering course – maintenance works – specification for weathering course – lime jelly concrete with tiles – thermal insulation combined with water proofing for flat concrete roofs – water proofing – expansion joints – repair of rain water leakage in buildings

Text Books:

1. A text book on Building services, R.Udyakumar, Eswar Press, Chennai
2. Building construction, Dr.B.C.Punmia, Laxmi Publications (p) Ltd, New Delhi

Reference Books :

1. National Building code of India – 2005, Bureau of Indian Standards, New Delhi
2. Building construction, P.C.Varghese, PHI Learning Pvt. Ltd, New Delhi
3. Building repair and maintenance management, P.S.Gahlot, CBS Publishers & distributors (p) Ltd.
4. Maintenance of Buildings, A C Panchdhari, New Age International Publications, Chennai.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-614 ESTIMATING AND COSTING - II

SUBJECT	INSTRUCTION		EXAMINATION			
	Hrs / Week	Hrs / Sem	Marks			Duration
R5-614 ESTIMATING AND COSTING - II	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No.	Topics	Hrs
I	SPECIFICATION WRITING AND REPORT WRITING	13
II	VALUATION AND RENT CALCULATION	13
III	ANALYSIS OF RATES FOR SANITARY AND WATER SUPPLY WORKS, ANALYSIS OF RATES FOR BRIDGE / ROAD WORKS AND MISCELLANEOUS ITEMS	13
IV	TAKING OFF QUANTITIES OF P H ENGINEERING STRUCTURES USING TRADE SYSTEM	13
V	TAKING OFF QUANTITIES OF ROAD / BRIDGE STRUCTURES USING TRADE SYSTEM	13
Total Instruction Hours		65

UNIT - I**SPECIFICATION WRITING AND REPORT WRITING****13 Hrs**

Specification Writing: Specification – necessity – importance of – types of specifications – general specification, detailed specification and standard specification – essential requirements of specifications – general and technical provisions of detailed specifications – specifications for various materials like cement, sand, brick, timber, stone aggregate, reinforcement steel, tiles, bitumen, water etc – general specification for a building – general specification for a culvert – general specification for a concrete / tar road project – examples – detailed specifications for works such as earth work excavation, foundation concrete, stone / brick masonry, doors / windows, RCC in columns / beams / slabs, plastering, flooring, painting / varnishing, DPC, AC sheet roofing, rain water pipes, centering for roofing, weathering course, under reamed piles, water bound macadam / tar roads, surface dressing with bitumen, revetments, etc – examples – steps involved in writing standard specification – advantages of standard specifications – writing standard specifications with reference to Tamil Nadu building practice / Indian standards / NBC – examples

Report writing: Definition of report – types – necessity – documents to accompany the report – points to be considered while writing technical reports writing typical technical reports for the proposed projects such as:

- Construction of buildings (residential / hospital / school / community hall)
- Laying a village road (WBM / tar / concrete road)
- Construction of a bridge/ culvert across a river
- Construction of a pedestrian sub-way/ foot over bridge across a city road water supply system for a village.
- Sewage treatment plant for a residential colony in suburban area.
- Construction of a new bus terminus in developing town.

UNIT - II VALUATION AND RENT CALCULATION

13 Hrs

Valuation: Value – difference between cost and value – purpose of valuation – definition of terms: capital cost, gross income and net income, outgoings, capitalized value and capital value, scrap value, salvage value, obsolescence, sinking fund, depreciation, years purchase, book value, market value, rateable value, deferred value of land, lease, mortgage, annuity, amortization– factors affecting the value of a property – classification of properties – types of leases – problems on determination of sinking fund – problems on calculation of depreciation – methods of valuation of buildings – valuation based on comparison / rent / profit / present value – methods of valuation of lands – mathematics of valuation – valuation tables – problems on valuation of buildings / properties

Rent Calculation: Fixation of rent – definition of terms: standard rent, fair rent or reasonable rent, economical rent, market rent, rent certificate – rent control – factors influencing the rent of a building – problems on rent calculation – fixing rent of a private building used by Government – fixing rent of a government building used by its employees– fixing rent of a Government building rented to private parties

UNIT - III ANALYSIS OF RATES FOR SANITARY AND WATER SUPPLY WORKS, ANALYSIS OF RATES FOR BRIDGE / ROAD WORKS AND MISCELLANEOUS ITEMS 13 Hrs

Analysis of Rates for Sanitary and Water supply Works: Earth work in trenches – timbering of trenches laying stone ware / RCC / GI pipes – Lead joint for cast iron pipes – cutting and jointing GI Pipes, PVC pipes and stoneware pipes – constructing a man hole in the sewage line of a residence – providing a dispersion trench for the septic tank of a residential flat – supplying a ferro cement circular ring for well sinking – laying PVC plumbing lines concealed in to brick masonry walls – supplying and fixing Indian type water closets with flushing tanks – supplying and fixing European type water closet with flushing tank – supplying and fixing a wash basin with tap

Analysis of Rates for Bridge / Road Works and Miscellaneous Items: Random rubble stone masonry in abutments and piers – providing form work for deck slabs – RCC for columns / beams / deck slab – parapets – hand rails – earth filling in embankments – soling for a WBM road – laying WBM road over the existing soling – surface dressing – surface blinding – providing pre mix carpet – laying concrete roads – apron and revetment works in canals – wooden frames for doors – paneled doors – glazed windows – steel grill gates – steel grills for windows – supplying and fixing aluminum partitions – providing wooden shutters to lofts – expansion joint in RC roof (exposure to use of software in analysis of rates – not for examination)

UNIT - IV TAKING OFF QUANTITIES OF P H ENGINEERING AND STRUCTURES USING TRADE SYSTEM 13 Hrs

Preparing detailed estimate using trade system and take-off quantities for all items of works in the following P H Engineering structures:

- 1 Septic tanks with dispersion trench / soak pit
- 2 Open well with masonry staging
- 3 Rain water harvesting – shallow recharge well
- 4 Square RCC over head tank on four columns with staging

UNIT - V**TAKING OFF QUANTITIES OF ROAD / BRIDGE STRUCTURES USING TRADE SYSTEM****13 Hrs**

Preparing detailed estimate using trade system and take-off quantities for all items of works in the following road / bridge structures:

- 1 Water bound macadam road
- 2 Cement concrete road with side drains
- 3 Single span slab culvert
- 4 Tee beam bridge

Text Books:

1. L.N.Dutta, "Estimating & Costing", Dhanpat Rai & Sons
2. N.A.Shaw, "Quantity Surveying & Valuation", Khanna Publishers;

Reference Books:

1. Rangawala, "Estimating & Costing" , Charotar Publishing;
2. Bridie, "Estimating & Costing"
3. Indian Standard Code of Practice, IS:1200.
4. Civil Estimating, Casting and Valuation – Kalson Publication Ludhiyana.
5. Vazirani & Chandolu," Estimating and Costing" 2001.

Instruction Hours	65 Hrs
Continuous Assessment Test 1, Test 2 & Model Exam	07 Hrs
Revision / Discussion	03 Hrs
Total	75 Hrs

*Pattern of the Question paper (Internal and External) – General Pattern (Theory)

R5-615 HYDRAULICS PRACTICAL

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-615 HYDRAULICS PRACTICAL	4 Hrs	60 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

LIST OF EXPERIMENTS**Flow of fluids:****50 Hrs**

1. Verification of Bernoulli's theorem.
2. Flow through Venturimeter – Determination of co-efficient of discharge.
3. Flow through Orificemeter – Determination of co-efficient of discharge.

Flow through orifice:

4. Determination of co-efficient of discharge by time fall-head method
5. Determination of co-efficient of discharge by constant head method

Flow through external cylindrical mouth piece:

6. Determination of co-efficient of discharge by timing fall in head method
7. Determination of co-efficient of discharge by constant head method

Flow through pipes:

6. Determination of friction factor for the given GI pipe / PVC pipe.

Flow through notch:

7. Determination of co-efficient of discharge for Rectangular Notch / V-Notch

Pumps:

10. Reciprocating pump – To draw characteristic curves.

11. Centrifugal pump – To draw characteristic curves.

Reference Books:

1. Hydraulic Lab Manual Compiled - T.T.T.I. – Chennai – 113

2. Experimental Hydraulic – Ghosh and Talapohia – Khanna Publishers – New Delhi

Examination Pattern:

Note: All the exercises in each section have to be completed. One exercise will be given for examination. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

S. No	Allocation of Marks	Max. Marks
1	Procedure	10
2	Tabulation and Observation	25
3	Calculations	20
4	Sketch / Graph	10
5	Accuracy of result	05
6	Viva-voce	05
Total		75 Marks

Practical Exercises	50 Hrs
Revision / Repetition	10 Hrs
Total	60 Hrs

R5-616 STRUCTURAL ENGINEERING PRACTICAL

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
			Internal Assessment	External Exam	Total	
R5-616 STRUCTURAL ENGINEERING PRACTICAL	4 Hrs	60 Hrs	25	75	100	3 Hrs

Exercises:**52 Hrs**

1. Preparation of specimens for various exercises (not for examination)
2. Flexural test on beams of singly reinforced section
3. Flexural test on beams of doubly reinforced section
4. Flexural test on small span slabs under uniform loading
5. Testing of RCC column under axial load
6. Test on fly ash concrete cubes for compression
7. Determination of flexural tensile strength of concrete

8. Determination of modulus of elasticity for concrete
9. Split tensile strength for concrete
10. Tensile test on welded connection
11. Tensile test on bolted / riveted connection
12. Flexural test on steel beam

Examination Pattern:

Note: All the exercises in each section have to be completed. One exercise will be given for examination. The students are allowed to select the questions by lot. Record notebook should be submitted during the practical examination.

Procedure and equipment handling	25 marks
Calculation and tabulation	40 marks
Result	05 marks
Viva-voce	05 Marks
Total	75 marks

Practical Exercises	52 Hrs
Revision / Repetition	08 Hrs
Total	60 Hrs

R5-617 PROJECT WORK

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hrs / Week	Hrs / Sem	Marks			
R5-617 PROJECT WORK	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

WORKS INVOLVED IN PROJET WORK:

Collection of data from various Journals and Civil Engineering magazines about the list of Projects given below – select a suitable project based on the data collected and available resources in your locality – surveyed site plan – site particulars – preparation of architectural drawings – soil type in the location – specification for materials & construction procedure – structural design – preparation of detailed estimate, data as per current schedule of rates and abstract estimate – structural drawings – preparation of report about the project.

IMPORTANT DOCUMENTS TO BE REFERRED FOR THE ABOVE ACTIVITIES:

Sl. No	Activity	Reference
1	Preparation of Architectural Drawings	1. Building Regulations of Locality 2. National Building Code, etc

2	Structural design	1. Relevant IS code for Masonry structures, Steel structures etc 2. IS 456 for Reinforced Cement Concrete 3. Hand book on detailing for Reinforcement (SP-34)
3	Specification of material and work procedure	1. Construction procedure by State Govt. organization viz. PWD, Highways etc. 2. Construction procedure by Central Govt. organization viz. CPWD, Railways, etc. 3. Specification by Architect etc.,

Note: Minimum Marks for Pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the Autonomous Examination alone.

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Get exposure on industrial environment and its work ethics.
- Understand what entrepreneurship is and how to become an entrepreneur.
Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.
- Understand the facts and importance of environmental management.
- Understand and gain knowledge about disaster management

INTERNAL ASSESSMENT:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of assessment	Period of assessment	Max. Marks
First Review	6 th week	10
Second Review	14 th week	10
Attendance	Entire semester	05
Total		25

Examination Pattern:

Details of Mark allocation	Max Marks
Marks for Report Preparation, Demo, Viva-voce	60
Marks for answers of 4 questions which is to be set by the external examiner from the given question bank consisting of questions in the following two topics Entrepreneurship, Disaster Management and Environmental Management. Out of four questions two questions to appear from each of the above topics i.e 2 questions x 3 topics = 6 questions. 6 questions x 2 ½ marks = 15 Marks	15
Total	75

DETAILED SYLLABUS

ENTREPRENEURSHIP, ENVIRONMENTAL MANAGEMENT AND DISASTER MANAGEMENT

1. ENTREPRENEURSHIP

1.1 Introduction – entrepreneur – characteristics of entrepreneur – contributions of an entrepreneur – functions of entrepreneur – barriers to entrepreneurship – roll of government in entrepreneurial development.

1.2 Small Scale Industries (SSI) – SSI role in country's economic growth – importance of SSI-starting of an SSI – Government organization and non-governmental organizations supporting SSI – DIC, NSIC, SIDO, KVIC, Development banks and their objectives – role of commercial banks in assisting SSI – women entrepreneurs and opportunities – subsidy and concessions to small scale industries.

2. ENVIRONMENTAL MANAGEMENT

2.1 Introduction – environmental ethics – assessment of socio economic impact – environmental audit – mitigation of adverse impact on environment – importance of pollution control – types of industries and industrial pollution.

2.2 Solid waste management – characteristics of industrial wastes – methods of collection, transfer and disposal of solid wastes – converting waste to energy – hazardous waste management treatment technologies.

2.3 Waste water management – characteristics of industrial effluents – treatment and disposal methods – pollution of water sources and effects on human health.

2.4 Air pollution management – sources and effects – dispersion of air pollutants – air pollution control methods – air quality management.

2.5 Noise pollution management – effects of noise on people – noise control methods.

3. DISASTER MANAGEMENT

3.1 Introduction – disasters due to natural calamities such as earthquake, rain, flood, hurricane, cyclones etc – man-made disasters – crisis due to fires, accidents, strikes etc – loss of property and life.

3.2 Disaster mitigation measures – causes for major disasters – risk identification – hazard zones – selection of sites for industries and residential buildings – minimum distances from sea – orientation of buildings – stability of structures – fire escapes in buildings – cyclone shelters – warning systems.

3.3 Disaster management – preparedness, response, recovery – arrangements to be made in the industries / factories and buildings – mobilization of emergency services – search and rescue operations – first aids – transportation of affected people – hospital facilities – fire fighting arrangements – communication systems – restoration of power supply – getting assistance of neighbours / other organizations in recovery and rebuilding works – financial commitments – compensations to be paid – insurances –rehabilitation.

LIST OF QUESTIONS:

1. ENTREPRENEURSHIP

1. Define the term Entrepreneur.
2. What is Entrepreneurship? Explain.
3. List the stages of decisions an entrepreneur has to make before reaching the goal.
4. What is innovation?

5. State briefly the role of an entrepreneur in the economic growth of a country.
6. List the characteristics of an Entrepreneur.
7. What are the critical elements of an Entrepreneur?
8. State the major functions of an Entrepreneur.
9. What are barriers to Entrepreneurship?
10. Define Small Scale Industry.
11. What are the qualities of Entrepreneur?
12. What are the benefits of Entrepreneur?
13. What are the various SSI that can flourish in your district?
14. Identify the infrastructural needs for an industry.
15. What are the various agencies involved in the establishment and development of SSI?
16. Name some of the agencies funding SSI.
17. Explain the roles played by Government in Entrepreneurial development.
18. What are the various concessions and incentives available for a SSI.
19. Name some consumer products with demand that can be manufactured by a SSI?
20. What is feasibility study?
21. What is the importance of SSI?
22. What is DIC? State its functions.
23. What is NSIC? State its functions.
24. What is SIDO? State its functions.
25. Name the Development Banks in India working towards Entrepreneurial development.
26. State the role of commercial bank in assisting SSI sector.
27. What are the different phases of Entrepreneurial Development programme?
28. What is an Industrial Estate?
29. What are the facilities available in an Industrial Estate?
30. Identify the various training agencies associated with SSI.
31. List the govt. agencies from whom you shall get financial assistance for a SSI.
32. What is KVIC? State its objectives.
33. Name some state finance corporations.
34. What are the steps involved in preparing a feasibility report?
35. What are the factors to be considered regarding raw materials for a SSI?
36. What are the features of a SSI?
37. What are the advantages of becoming an Entrepreneur?
38. Name the Organizations offering assistance for the development of Women Entrepreneur
39. State the business opportunities for Women entrepreneurs.
40. State the different subsidies given to SSI's.

2. ENVIRONMENTAL MANAGEMENT

1. What is the responsibility of an Engineer of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control?
5. List the different types of pollutions caused by a Chemical / Automobile / Cement factory.
6. What is meant by Hazardous waste?
7. Define Industrial waste management.
8. Differentiate between garbage, rubbish, refuse & trash based on composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal?
11. What are the different methods of disposal of solid wastes?
12. Explain how the principle of recycling could be applied in the process of waste minimization.
13. Define the term 'Environmental Waste Audit'.
14. List and discuss the factors pertinent to the selection of landfill site.
15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth
16. Describe any two methods of converting waste into energy.

17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
18. Write a note on Characteristics of hazardous waste.
19. What is the difference between municipal and industrial effluent ?
20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.
22. Explain briefly the Physical treatments “Sedimentation” and “Floatation” processes in the waste water treatment.
23. Explain briefly when and how chemical / biological treatments are given to the waste water.
24. List the four common advanced waste water treatment processes and the pollutants they remove.
25. Describe refractory organics and the method used to remove them from the effluent.
26. Explain biological nitrification and de-nitrification.
27. Describe the basic approaches to land treatment of Industrial Effluent.
28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.
30. List out the names of any three hazardous air pollutants and their effects on human health.
31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
32. Differentiate between acute and chronic health effects from Air pollution.
33. Define the term acid rain and explain how it occurs.
34. Discuss briefly the causes for global warming and its consequences
35. Suggest suitable air pollution control devices for a few pollutants and sources.
36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
38. What is the advantage of Ozone layer in the atmosphere?
39. Explain the mechanism by which hearing damage occurs.
40. List any five effects of noise other than hearing damage.
41. Explain why impulsive noise is more dangerous than steady state noise.
42. Explain briefly the source – path – receiver concept of Noise control.
43. Where silencers or mufflers are used? Explain how they reduce the noise.
44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

3. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and man made disasters with examples.
3. Describe the necessity of risk identification & assessment surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.

8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu like: (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones
12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone – A, (b) High damage risk zone, (c) Low damage risk zone.
13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.
14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.
15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
16. What is a cyclone shelter? When and where it is provided? What are its requirements?
17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river?
18. What are the causes for fire accidents? Specify the remedial measures to be taken in buildings to avoid fire accidents.
19. What is a fire escape in multistoried buildings? What are its requirements?
20. How the inmates of a multistory building are to be evacuated in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
21. Describe different fire fighting arrangements to be provided in an Industry.
22. Explain the necessity of disaster warning systems in Industries.
23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster?
25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding?
26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?
27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?
28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How-to manage such a situation?
29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
30. Explain the necessity of medical care facilities in an Industry / Project site.
31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.
32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?
33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?
35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearby lake / dam, during heavy rain?
36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?

38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?
41. Explain the legal / financial problems the management has to face if safety measures taken by them are found to be inadequate.
42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
45. Why residential quarters are not constructed nearer to Atomic Power Plants?

LIST OF SUGGESTED PROJECTS

COMPARITIVE STUDY

- Conventional and composite concrete mixtures
- Light weight construction materials
- Prefabricated and RCC structures
- Cost comparison of steel and RCC structures
- Cost comparison of pre-stressed and RCC structures

ADMIXTURES

- Economy of using admixture in concrete.
- Partial replacement of conventional constituent materials

MIX DESIGN

- Comparative study of mix design by different methods

SPECIAL TYPES OF CONCRETE CONSTRUCTION

- Bamboo as a reinforcing material
- Ferro cement products – water Tanks, Septic tank
- Fiber reinforced concrete
- Self Compacting concrete

PAPER PROJECTS

- Residential Houses Primary Health center School Buildings Guest House
- Panchayat Union Office Building
- Bank Building
- Post Office Building
- College Building
- Hospital Building
- Hotel Building
- Factory Building
- Auditorium
- Shopping Centre
- Community Hall
- Theatre
- Market Building
- Rural Bus Stand
- Stadium
- Swimming Pool
- Over head tank for a village

- New village road with culvert
- Small Bridge
- Plate Girder Bridge
- Septic Tank for a Colony

ENVIRONMENTAL MANAGEMENT PROJECTS

- Treatment of Wastewater and recirculation for a Colony
- Solid waste management in a Colony
- Hydrological data Collection for a river basin/water shed
- Industrial effluent Collection and analysis
- Green buildings
- Passive architecture buildings

MISCELLANEOUS

- Using Factory Waste (such as steel, fly-ash, thermo cool etc) as substitute for building materials
- Low Cost Housing
- Rehabilitation of structures
- Smart structures

A neatly prepared PROJECT REPORT in the following format has to be submitted individually during the Project Work & Viva-voce Autonomous examination.

FORMAT FOR PREPARATION OF PROJECT REPORT

1. ARRANGEMENT OF CONTENTS:

The sequence in which the project report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Bonafide Certificate
3. Abstract
4. Table of Contents
5. List of Tables
6. List of Figures
7. List of Symbols, Abbreviations and Nomenclature
8. Chapters
9. Appendices
10. References

The table and figures shall be introduced in the appropriate places.

2. PAGE DIMENSION AND BINDING SPECIFICATIONS:

The dimension of the project report should be in A4 size. The project report should be bound using flexible cover of the thick white art paper. The cover should be printed in black letters and the text for printing should be identical.

3. PREPARATION FORMAT:

3.1 Cover Page & Title Page: A specimen copy of the Cover page & Title Page and Bonafide Certificate of the project report will be given in Appendix - I and Appendix - II.

- 3.2 Bonafide Certificate:** The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 14. The certificate shall carry the Guide's signature and shall be followed by the guide's name, Academic designation (not any other responsibilities of administrative nature), Department and full address of the Institution. The term 'GUIDE' must be typed in capital letters between the Guide's name and academic designation.
- 3.3 Abstract:** Abstract should be one page synopsis of the project report typed in double line spacing, Font Style Times New Roman and Font Size 14.
- 3.4 Table of Contents:** The table of contents should list all material following it as well as any material which precedes it. The title page and Bonafide Certificate will not find a place among the items listed in the Table of Contents but the page numbers of which are in lower case Roman letters. One and a half spacing should be adopted for typing the matter under this head.
- 3.5 List of Tables:** The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.
- 3.6 List of Figures:** The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.
- 3.7 List of Symbols, Abbreviations and Nomenclature:** One and a half spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.
- 3.8 Chapters:** The chapters may be broadly divided into 3 parts
 (I) Introductory chapter
 (II) Chapters developing the main theme of the project work such as
 1. Objectives
 2. Collection of data and required survey work
 3. Management and construction procedure
 4. Resources scheduling and networking
 5. Design details
 6. Required drawing set
 7. Utility to society if any, and
 (III) Conclusion.

The main text will be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions. Each chapter should be given an appropriate title.

Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.

Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page, which refers to the material they annotate.

- 3.9 Appendices:** Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme.
- Appendices should be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2, etc.

- Appendices, Tables and References appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.
- Appendices shall carry the title of the work reported and the same title shall be made in the contents page also

3.10 Table and figures: By the word Table, is meant tabulated numerical data in the body of the project report as well as in the Appendices. All other non-verbal materials used in the body of the project work and appendices such as charts, graphs, maps, photographs and diagrams may be designated as figures.

3.11 List of References: The listing of references should be typed 4 spaces below the heading “REFERENCES” in alphabetical order in single spacing left-justified. The reference material should be listed in the alphabetical order of the first author. The name of the author / authors should be immediately followed by the year and other details.

Eg: 1. Neville, A. M., Concrete Technology, Fourth edition, Pearson Education, New Delhi.

4. TYPING INSTRUCTIONS:

The impression on the typed copies should be black in colour. One and a half spacing should be used for typing the general text. The general text shall be typed in the Font style ‘Times New Roman’ and Font size 12.

APPENDIX - I

(A typical Specimen of Cover Page & Title Page)

TITLE OF PROJECT REPORT

<1.5 line spacing>

A PROJECT REPORT

Submitted by

<Italic>

NAME OF THE CANDIDATE(S)

*Submitted for partial fulfillment of requirement for the award of the Diploma
in*

<1.5 line spacing><Italic>

BRANCH OF STUDY



**SRI RAMAKRISHNA MISSION
VIDYALAYA POLYTECHNIC COLLEGE**

<1.5 line spacing>

(AN AUTONOMOUS & ISO 9001:2008 CERTIFIED INSTITUTION)

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MONTH & YEAR

APPENDIX - II

(A typical specimen of Bonafide Certificate)

**SRI RAMAKRISHNA MISSION VIDYALAYA
POLYTECHNIC COLLEGE
COIMBATORE – 641 020**

BONAFIDE CERTIFICATE

Certified that this project report entitled “.....**TITLE OF THE PROJECT.....**” is the bonafide work done by “.....**NAME OF THE CANDIDATE.....**” with his batch-mates, in partial fulfillment of the requirement for the award of Diploma in **BRANCH OF STUDY.....** under my guidance.

<<Signature of the Head of the Department>>

<<Signature of the Guide>>

SIGNATURE

<<Name>>

HEAD OF THE DEPARTMENT

<<Academic Designation>>

<<Department>>

SIGNATURE

<<Name>>

GUIDE

<<Academic Designation>>

<<Department>>

Submitted for Autonomous Examination held on

INTERNAL EXAMINER

EXTERNAL EXAMINER