MOM II MEETING UDAC ONLINE HELD ON 02122020.pdf

SCHEME CE 2018-19.pdf

Syllabus CE 2018-19.pdf

Department of Civil Engineering

Scheme & Syllabus

of

Bachelor of Technology

Civil Engineering

From III to VIII Semester

For students admitted in session 2018-19

University Teaching Departments

Rajasthan Technical University, Kota

Approved
Dean, FA & UD

Minutes of Meeting
II Meeting (online) of Academic Council, University Departments, RTU, Kota
27 November, 2020, 3:30 pm

Ref. Number: **Date : 28-11-2020**

II Meeting of Academic Council, University Departments, RTU, KOTA was convened through online mode on 27-11-2020 at 3:30 PM using Google Meet under the Chairmanship of Prof. A.K. Mathur, Dean, Faculty Affairs. Following members were present:

1. Prof. B.P. Suneja
2. Prof. Rajiv Gupta
3. Prof. Dinesh Birla
4. Prof. S. R. Kapoor
5. Prof. V.K. Gorana
6. Prof. A.K. Chaturvedi
7. Prof. Vivek Pandey
8. Prof. K.S. Grover
9. Dr. R.K.Bayal
10. Dr S. D. Purohit
11. Dr. Sanju Tanwar
12. Shri Manoj Vaishnav
13. Shri Ashok Patni
14. Dr. Vikas Bansal (Member Secretary)

Following agendas related to academic has been discussed and resolved into the meeting:

Agenda 1: Modifications/ improvement in CBCS regulations for Undergraduate programmes

Looking towards the model curriculum provided by the AICTE and to improve the academics of University Departments, RTU, Kota in the prevailing situations, modifications may be made in the CBCS regulations. A committee was formed for modifications in CBCS regulation as decided in the meeting of Head of Departments held in the month of September 2020. The committee has recommended CBCSUG-2020 after incorporating modifications in CBCSUG-2017. CBCSUG-2020 may be affected from the students admitted in 2020-21 and onwards. Modified regulations (CBCSUG-2020) as enclose in Annexure-1 is submitted herewith for approval. These shall be affected from

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the students admitted in 2020-21 and onwards after approval. Members are requested to approve.

Resolution: The Agenda was approved by the respected members. Following modifications were suggested and approved by the respected members in proposed CBCSUG-2020 by the committee (appointed on September 05, 2020 in the meeting of Head of Departments):

i. Industrial Training (as mentioned in Section 6 and other Sections of the proposed CBCSUG-2020) has been considered as Credit courses in place of non-graded core courses. Therefore, 5 non-graded units have been changed to 5 Credits.

ii. As suggested by HVC, SODECA, which was also non-graded core course (as mentioned in Section 6 and other Sections of the proposed CBCSUG-2020), has also been converted to Credit course. Therefore, 4 non-graded units of SODECA have been changed to 4 Credits of SODECA (Anandam).

iii. Above two changes have been resulted into change in the minimum credit requirement criterion (as mentioned in Section 4 and other Sections of the proposed CBCSUG-2020) for passing the B.Tech. degree. Now, minimum credit requirement is 164 Credits along with 11 non- graded units in place of 155 Credits along with 20 non- graded units as suggested by the committee (appointed on September 05, 2020 in the meeting of Head of Departments).

iv. In ADDITION of grades S and Z (as mentioned in Section 6 and other Sections of the proposed CBCSUG-2020), two more grades V for excellent performance and G for good performance has also been.

v. As mentioned in Appendix-1 and other Sections of the proposed CBCSUG-2020, In first year scheme, Engineering Mechanics and Introduction to Electrical and Electronics Engineering has been replace by Basic Mechanical Engineering, Basic Civil Engineering and Introduction to Electrical and Electronics Engineering. Students of CS, EC, EE, EIC, IT will study Basic Mechanical Engineering and Basic Civil Engineering. Students of CE, PE, PC will study Basic Mechanical Engineering and Introduction to Electrical and Electronics Engineering. Students of AE, ME, PIE will study Basic Civil Engineering and Introduction to Electrical and Electronics Engineering.

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vi. As per the guidelines of AICTE and as suggested and approved in the UDAC meeting, Minor degree or Honours shall be added in the B. Tech. degree on completing courses of extra 20 credits in the inter-disciplinary specialization or Departmental specialization respectively. This provision has been placed in place of the option for both Minor degree and Honours (as mentioned in Section 5, Appendix-3 and other Sections of the proposed CBCSUG-2020) on clearing extra 40 credits as suggested by the committee (appointed on September 05, 2020 in the meeting of Head of Departments).

vii. Therefore, the minimum requirement for obtaining Minor degree or Honours (as mentioned in Section 5, Appendix-3 and other Sections of the proposed CBCSUG-2020) with B. Tech. Degree becomes 184 credit and 11 non-graded units.

viii. List of MOOC courses may also be prepared from the option available to the BOS other than 4 agency prescribed in the proposed CBCSUG-2020 (as mentioned in Section 5 and other Sections of the proposed CBCSUG-2020) by the committee. The list of MOOCS prepared by the BOS shall be approved by Dean UD.

ix. The provision for obtaining the grades in the MOOC COURSES as suggested by the committee and as mentioned in Section 5 and other Sections has been replaced by the following provision as suggested and approved by the Hon'ble members that In House examination / evaluation will be carried out for the MOOC COURSES as held for regular courses. The grading of the MOOC courses will be done on the basis of these examinations/evaluations. A Course Coordinator will be assigned for each MOOC COURSE.

x. Theory and Practical courses will be treated as separate courses.

xi. The provision of 'Self-study course' as mentioned at Sub. Section 4.11 of Section 4 of proposed CBCSUG-2020 has been deferred.

xii. The provision of 'Exit policy' as mentioned at Sub. Section 4.13 of Section 4 of proposed CBCSUG-2020 has been deferred till announced by AICTE and other regulating bodies.

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xiii. Minimum number of students in Departmental Elective has been replaced by 'minimum of 10 or actual number of students admitted' in place of '10' (as mentioned in Section 3.3 and other Sections of the proposed CBCSUG-2020).

Agenda 2: To approve B. Tech. Curriculum applicable for students admitted in 2017-18

In pursuance of the CBCS Regulations, the teaching schemes have been revised form 2017-18 by the concerned BOS, these are placed for kind perusal of members (Annexure 2). Members are requested to approve.

Resolution: The Agenda was approved by the respected members.

Agenda 3: To approve B. Tech. Curriculum applicable for students admitted in 2018-19

In Academic session 2018-19, a revised teaching scheme for I and II semester in line with that in RTU was adopted on recommendation of the BOS and approval of the Vice Chancellor .

In the prevailing market conditions and as per the model curriculum provided by AICTE, it has been discussed in the meeting of Head of Departments held in the month of September 2020 to **include One MOOC courses each in VII and VIII semester aggregating to 7 Credit in the scheme for the students admitted in 2018-19.** 8-10 weeks of MOOC courses shall be considered for 3 credits and 12-16 weeks for MOOC courses shall be considered for 4 credits. A list of the MOOC courses shall be submitted by the respective BOS, two months before the start of the respective semester . The students have to select the MOOC courses from the list provided by the concerned BoS. The MOOCs courses available on the following site/platform will be recognized.

Initiative	Institution Behind Platform	Website Link
NPTEL	IIT Madras	nptel.ac.in/
mooKIT	IIT Kanpur	www.mookit.co/
IITBX	IIT Bombay	iitbombayx.in/
SWAYAM	MHRD and Microsoft	Swayam.gov.in

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Only those MOOCs courses will be considered for fulfilling the requirement of the B.Tech. Degree, which have certification.

The student will inform in writing to respective Head of the Department about the MOOCs courses intended to register from the list provided by concerned BoS at the time of registration of other courses. The HOD shall verify the authenticity of the course as per points mentioned above. The student shall submit the certificate along with the credit earn to the HOD, who will ensure to submit the information about the credit and grade earn by the student during the semester (through the MOOCs courses) at the time of submission of other course grades. Before submitting the grade of MOOC course registered by the student, the HOD shall convert the grade of the MOOC course to the grading system of CBCS of University Departments. For conversion, first the grade of the course shall be converted to equivalent marks using the rules prevalent at the institute offering the MOOC course and then marks shall be converted to equivalent grade of CBCS of University Departments.

In pursuance of the CBCS Regulations, the revised teaching schemes are placed for kind perusal of members (Annexure 3). Members are requested to approve.

Resolution: The Agenda was approved by the respected members after having following modifications:

The provision for obtaining the grades in the MOOC COURSES as suggested above has been replaced by the following provision as suggested and approved by the Hon'ble members that In House examination / evaluation will be carried out for the MOOC COURSES as held for regular courses. The grading of the MOOC courses will be done on the basis of these examinations/evaluations. A Course Coordinator will be assigned for each MOOC COURSE.

Agenda 4: To approve B. Tech. Curriculum applicable for students admitted in 2019-20

In Academic session 2019-20, a revised teaching scheme for I and II semester in line with that in RTU was adopted on recommendation of the BOS.

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Dean, FA & UD

In the prevailing market conditions and as per the model curriculum provided by AICTE, it has been discussed in the meeting of Head of Departments held in the month of September 2020 to **include One MOOC courses each in VII and VIII semester aggregating to 7 Credit in the scheme for the students admitted in 2019-20.** 8-10 weeks of MOOC courses shall be considered for 3 credits and 12-16 weeks for MOOC courses shall be considered for 4 credits. A list of the MOOC courses shall be submitted by the respective BoS, two months before the start of the respective semester . The students have to select the MOOC courses from the list provided by the concerned BoS. The MOOCs courses available on the following site/platform will be recognized.

Initiative	Institution Behind Platform	Website Link
NPTEL	IIT Madras	nptel.ac.in/
mooKIT	IIT Kanpur	www.mookit.co/
IITBX	IIT Bombay	iitbombayx.in/
SWAYAM	MHRD and Microsoft	Swayam.gov.in

Only those MOOCs courses will be considered for fulfilling the requirement of the B.Tech. Degree, which have certification.

The student will inform in writing to respective Head of the Department about the MOOCs courses intended to register from the list provided by concerned BoS at the time of registration of other courses. The HOD shall verify the authenticity of the course as per points mentioned above. The student shall submit the certificate along with the credit earn to the HOD, who will ensure to submit the information about the credit and grade earn by the student during the semester (through the MOOCs courses) at the time of submission of other course grades. Before submitting the grade of MOOC course registered by the student, the HOD shall convert the grade of the MOOC course to the grading system of CBCS of University Departments. For conversion, first the grade of the course shall be converted to equivalent marks using the rules prevalent at the institute offering the MOOC course and then marks shall be converted to equivalent grade of CBCS of University Departments.

Anil K. Mathews
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In pursuance of the CBCS Regulations, the teaching schemes are placed for kind perusal of members (Annexure 3). In pursuance of the CBCS Regulations, the revised teaching schemes are placed for kind perusal of members (Annexure 4). Members are requested to approve.

Resolution: The Agenda was approved by the respected members after having following modifications:

The provision for obtaining the grades in the MOOC COURSES as suggested above has been replaced by the following provision as suggested and approved by the respected members that In House examination / evaluation will be carried out for the MOOC COURSES as held for regular courses. The grading of the MOOC courses will be done on the basis of these examinations/evaluations. A Course Coordinator will be assigned for each MOOC COURSE.

Agenda 5: To approve B. Tech. Curriculum applicable from 2020-21 and onwards for first year

In pursuance of **the revised** CBCS Regulations, the teaching schemes are placed for kind perusal of members (Annexure 5). Members are requested to approve.

Resolution: The Agenda was approved by the respected members after following modifications:

In first year scheme Engineering Mechanics and Introduction to Electrical and Electronics Engineering has been replaced by Basic Mechanical Engineering, Basic Civil Engineering and Introduction to Electrical and Electronics Engineering. Students of CS, EC, EE, EIC, IT will study Basic Mechanical Engineering and Basic Civil Engineering. Students of CE, PE, PC will study Basic Mechanical Engineering and Introduction to Electrical and Electronics Engineering. Students of AE, ME, PIE will study Basic Civil Engineering and Introduction to Electrical and Electronics Engineering.

Agenda 6: To approve BOS of HEAS department.

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Approved
Dean, FA & UD

In pursuance of CBCS Regulations, the BOS of HEAS department is placed for kind perusal of members (Annexure 6). Members are requested to approve.

Resolution: The Agenda was approved by the respected members.

Agenda 7: To approve policies and guidelines regarding academics and examination which are not in practice during pre COVID periods (Normal circumstances).

The extra ordinary situation arisen due to COVID-19, forces the administration to adopt some policies regarding academics and examination which are not in practice during pre COVID periods. Govt. of Rajasthan, Office of HVC and COE issued some guidelines for the academics and examination process. Members are requested to approve the same for University Departments, RTU, Kota.

Members are requested to approve.

Resolution: The Agenda was approved by the respected members.

Reporting Item:

There are no guidelines for preparation of grades for back /improvement examinations in the present CBCS regulations. A committee was formed and approved by HVC for addressing this issue. Following provisions were proposed by the committee and approved by HVC in 2019 (note-sheet enclosed):

a. If the back exam is conducted with main exam then the grading may be calculated with the main exam students.
b. In case the back exam is conducted separately, then the grading may be calculated along with the previous main exam. However, the grading of the students (awarded already) will remain unaffected.

Resolution: The Agenda was approved by the respected members.

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Approved
Dean, FA & UD

The meeting ended with a vote of thanks to The Chair

Dr Vikas Bansal
Member Secretary, UDAC)

Prof Anil Mathur
Chairman, UDAC

Copy to:

1. **PS to HVC for Approval in BOM**
2. **Members of UDAC**

Dr Vikas Bansal

Member Secretary, UDAC)

Prof Anil Mathur

Chairman, UDAC

FOR 2017-18 ADMITTED BATCH OF B.TECH. CIVIL ENGINEERING

Scheme of III sem B Tech (Civil Engineering)

(Applicable for the batch admitted in 2018-19) & 2019-20

THEORY & PRACTICAL

Code	Title	Contact hrs/week				Marks			Credits
		L	T	P	Total	I/A	T/E	Total	
3CEU01	Strength of Materials-I	3	1	0	4	50	100	150	4
3CEU02	Fluid Mechanics	3	1	0	4	50	100	150	4
3CEU03	Civil Engineering Materials	3	0	0	3	50	100	150	3
3CEU04	Construction Technology	3	0	0	3	50	100	150	3
3CEU05	Advanced Engineering Mathematics	3	0	0	3	50	100	150	3
3CEU06	Engineering Geology	2	0	0	2	50	100	150	2
	Sub Total	**17**	**2**	**0**	**19**	**300**	**600**	**900**	**19**
3CEU11	Building Drawing-I	0	0	3	3	50	25	75	2
3CEU12	Geology Lab	0	0	2	2	50	25	75	1
3CEU13	Fluid Mechanics Lab	0	0	2	2	50	25	75	1
3CEU14	Material Testing Lab	0	0	2	2	50	25	75	1
3CEU20	Extra Curricular & Discipline	0	0	0	0	50	0	50	1
	Sub- Total	**0**	**0**	**9**	**9**	**250**	**100**	**350**	**6**
	TOTAL	**17**	**2**	**9**	**28**	**550**	**700**	**1250**	**25**

SIGNED BY BOS MEMBERS

Anil K. Mathus

Approved
Dean, FA & UD

Scheme of IV sem B Tech (Civil Engineering)

(Applicable for the batch admitted in 2018-19) & 2019-20

THEORY & PRACTICAL

Code	Title	Contact hrs/week				Marks			Credits
		L	T	P	Total	I/A	T/E	Total	
4CEU01	Strength of Materials-II	3	1	0	4	50	100	150	4
4CEU02	Hydraulics & Hydraulic Machines	3	1	0	4	50	100	150	4
4CEU03	Concrete Technology	3	0	0	3	50	100	150	3
4CEU04	Surveying	3	0	0	3	50	100	150	3
4CEU05	Quantity Surveying & Valuation	3	0	0	3	50	100	150	3
4CEU06	Building Planning	2	0	0	2	50	100	150	2
	SubTotal	**17**	**2**	**0**	19	300	600	900	19
4CEU11	Surveying Lab	0	0	3	3	50	25	75	2
4CEU12	Building Drawing-II	0	0	3	3	50	25	75	2
4CEU13	Concrete Technology Lab	0	0	2	2	50	25	75	1
4CEU14	Hydraulics & Hydraulic Machines Lab	0	0	2	2	50	25	75	1
4CEU20	Extra Curricular & Discipline	0	0	0	0	50	0	50	1
	Sub- Total	**0**	**0**	**10**	10	250	100	350	7
	TOTAL	**17**	**2**	**10**	29	550	700	1250	26

SIGNED BY BOS MEMBERS

Anil K. Mathus

Approved
Dean, FA & UD

Scheme of V sem B Tech (Civil Engineering)

(Applicable for the batch admitted in 2018-19) & 2019-20

THEORY & PRACTICAL

Code	Title	Contact hrs/week				Marks			Credits
		L	T	P	Total	I/A	T/E	Total	
5CEU01	Theory of Stuctures	3	1	0	4	50	100	150	4
5CEU02	Transportation Engineering	3	1	0	4	50	100	150	4
5CEU03	Environmental Engineering-I	3	0	0	3	50	100	150	3
5CEU04	Geotechnical Engineering-I	3	0	0	3	50	100	150	3
	ELECTIVE-I	3	0	0	3	50	100	150	3
5CEU5.1	Geomatics and Surveying								
5CEU5.2	Modern Concrete Technology								
5CEU5.3	Application of Numerical Methods in Civil Engineering								
	ELECTIVE-II	2	0	0	2	50	100	150	2
5CEU6.1	Energy Science and Engineering								
5CEU6.2	Disaster Management								
5CEU6.3	Construction Equipments and Management								
	Sub Total	**17**	**2**	**0**	**19**	**300**	**600**	**900**	**19**
5CEU11	Geotechnical Engineering Lab-I	0	0	3	3	50	25	75	2
5CEU12	Environmental Engineering Lab-I	0	0	2	2	50	25	75	1
5CEU13	Road Material Testing Lab	0	0	2	2	50	25	75	1
5CEU14	Structurakl Engineering Lab	0	0	2	2	50	25	75	1
5CEU20	Extra Curricular & Discipline	0	0	0	0	50	-	50	1
	Sub- Total	**0**	**0**	**9**	**9**	**250**	**100**	**350**	**6**
	TOTAL	**17**	**2**	**9**	**28**	**550**	**700**	**1250**	**25**

SIGNED BY BOS MEMBERS

Anil K. Mathur
Approved
Dean, FA & UD

Scheme of VI sem B Tech (Civil Engineering)

(Applicable for the batch admitted in 2018-19) & 2019-20

THEORY & PRACTICAL

Code	Title	Contact hrs/week				Marks			Credits
		L	T	P	Total	I/A	T/E	Total	
6CEU01	Design of Concrete Structures-I	3	1	0	4	50	100	150	4
6CEU02	Design of Steel Structures-I	3	1	0	4	50	100	150	4
6CEU03	Environmental Engineering-II	3	0	0	3	50	100	150	3
6CEU04	Geotechnical Engineering-II	3	0	0	3	50	100	150	3
	ELECTIVE-III	3	0	0	3	50	100	150	3
6CEU5.1	Analysis of Structure								
6CEU5.2	Solid and Hazardous Waste Management								
6CEU5.3	Rock Engineering								
	ELECTIVE-IV	2	0	0	2	50	100	150	2
6CEU6.1	Repair and Rehabilitation of Structures								
6CEU6.2	Earthquake Resistant Construction								
6CEU6.3	Traffic Engineering and Management								
	Sub Total	**17**	**2**	**0**	**19**	**300**	**600**	**900**	**19**
6CEU11	Environmental Engineering Lab-II	0	0	3	3	50	25	75	2
6CEU12	Geotechnical Engineering Lab-II	0	0	3	3	50	25	75	2
6CEU13	Concrete Structures Design-I	0	0	2	2	50	25	75	1
6CEU14	Steel Structures Design-I	0	0	2	2	50	25	75	1
6CEU20	Extra Curricular & Discipline	0	0	0	0	50	-	50	1
	Sub- Total	**0**	**0**	**10**	**10**	**250**	**100**	**350**	**7**
	TOTAL	**17**	**2**	**10**	**29**	**550**	**700**	**1250**	**26**

SIGNED BY BOS MEMBERS

Anil K. Mathur
Approved
Dean, FA & UD

Scheme of VII sem B Tech (Civil Engineering)

(Applicable for the batch admitted in 2018-19) & 2019-20

THEORY & PRACTICAL

Code	Title	Contact hrs/week				Marks			Credits
		L	T	P	Total	I/A	T/E	Total	
7CEU01	Design of Concrete Structures-II	3	1	0	4	50	100	150	4
7CEU02	Design of Steel Structures-II	3	1	0	4	50	100	150	4
7CEU03	Water Resource Engineering	3	0	0	3	50	100	150	3
7CEU04	Project Planning and Construction Management	3	0	0	3	50	100	150	3
	ELECTIVE-V	3	0	0	3	50	100	150	3
7CEU5.1	Fire and Safety Engineering								
7CEU5.2	Rural Water Supply and Sanitation								
7CEU5.3	Wind and Seismic Analysis								
	MOOC Course								4
	Sub Total	15	2	0	17	250	500	750	21
7CEU11	Design of steel/ concrete Structures	0	0	3	3	50	25	75	2
7CEU12	Design of Water Resource Structures	0	0	2	2	50	25	75	1
7CEU13	Professional Practice & Estimating	0	0	2	2	50	25	75	1
7CEU14	Practical Training & Industrial Visit	0	0	4	4	150	75	225	4
7CEU20	Extra Curricular & Discipline	0	0	0	0	50	0	50	1
	Sub- Total	0	0	11	11	350	150	500	9
	TOTAL	15	2	11	28	600	650	1250	30

SIGNED BY BOS MEMBERS

Anil K. Mathur
Approved
Dean, FA & UD

Scheme of VIII sem B Tech (Civil Engineering)

(Applicable for the batch admitted in 2018-19) & 2019-20

THEORY & PRACTICAL

Code	Title	Contact hrs/week				Marks			Credits
		L	T	P	Total	I/A	T/E	Total	
	Eelective-VI	3	0	0	3	50	100	150	3
8CEU1.1	Noise & Air-Pollution and Control								
8CEU1.2	Social Aspects in Civil Engineering								
8CEU1.3	Ground Improvement Techniques								
	Eelective-VII	3	0	0	3	50	100	150	3
8CEU2.1	Geographic Information System and Remote Sensing								
8CEU2.2	Town Planning								
8CEU2.3	Prestressed Concrete								
	Eelective-VIII	3	0	0	3	50	100	150	3
8CEU3.1	Foundation Engineering								
8CEU3.2	Pavement Design								
8CEU3.3	Bridge Engineering								
	MOOC Course								3
	Sub Total	**9**	**0**	**0**	**9**	**150**	**300**	**450**	**12**
8CEU11	Seminar	0	0	4	4	150	75	225	4
8CEU12	Project	0	0	12	12	350	175	525	12
8CEU20	Extra Curricular & Discipline	0	0	0	0	50	-	50	1
	Sub- Total	**0**	**0**	**16**	**16**	**550**	**250**	**800**	**17**
	TOTAL	**9**	**0**	**16**	**25**	**700**	**550**	**1250**	**29**
	TOTAL					**3500**	**4000**	**7500**	

SIGNED BY BOS MEMBERS

Approved
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SYLLABUS

OF

III SEMESTER

B.TECH. (CIVIL ENGINEERING)

(FOR 2018-19 ADMITTED BATCH)

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

III SEMESTER

3CEU01: STRENGTH OF MATERIALS–I (L-3, T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Simple Stresses and Strains: Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus; Tension test of mild steel and other materials: true and apparent stress, ultimate strength, yield stress and permissible stress;	**4**
Stresses in prismatic & non prismatic members and in composite members; Thermal stresses; Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants; Stresses in composite members, Compatibility condition	**5**
Compound Stress: Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle & it's application. **Moment of Inertia**: Polar and product moment of inertia, Principal axes and principal moment of inertia	**7**
Columns: Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae.	**5**
Membrane Analysis: Stress and strain in thin cylindrical & spherical shells under internal pressures.	**2**
Bending of Beams: Types of supports, support reactions, determinate and indeterminate structures, static stability of plane structures.	**3**
Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected o various types of loads and moments, Point of Contra-flexure, relation between load, SF and BM	**5**
Theory of simple bending: Distribution of bending and shear stresses for simple and composite sections	**8**
TOTAL	**40**

Suggested Readings:

1. *Mechanics of Structures Vol. I & II by S.B Junarkar, Charotar Publishing House, Anand.*
2. *Strength of Materials & Mechanics of Structures: Vol. I, II by Dr. B.C. Punmia Laxmi Publications (p) Ltd.*
3. *Strength of Material by Singer and Pytel, Harper Collins Publishers.*
4. *Elements of Strength of Materials by Timoshenko & Young, Mc Graw Hill Book Co.*
5. *Mechanics of Structures by Timoshenko & Gere, CBS Publishers and Distributers.*

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

III SEMESTER

3CEU02: FLUID MECHANICS (L-3, T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Fluids: Definition, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids.	**2**
Properties of Fluids: Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.	**4**
Hydrostatics : Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure gauge.	**4**
Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and met centric height experimental and analytical determination of met centric height.	**4**
Equilibrium of Fluid Particles and Flow: Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.	**2**
Hydro-kinematics: Types of Flows: Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrational motions, free and forced vortex, circulation and voracity velocity potential and stream function, elementary treatment of flow net. Euler's equations of motion and integration of Euler's equations, Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.	**7**
Applications of Bernoulli's Equation: Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula. Velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs.	**4**
Momentum Equation and its Application: Development of momentum equation by control volume concept, Momentum correction factor, applications – Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.	**4**
Flow Through Pipes: Laminar flow, Reynolds experiment, transition from laminar to turbulent flow. Turbulent Flow: Laws of fluid friction, friction factor Moodys diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes. Flow along a bypass. Power transmission through pipe, condition for maximum power. Elementary water hammer concept.	**8**
TOTAL	**40**

Suggested Readings:

1. *Fluid Mechanics by Modi & Seth, Standard Publishers, Delhi.*
2. *-Fluid Mechanics by Dr. K.R. Arora, Standard Publishers and Distributers, Delhi.*
3. *Fluid Mechanics by Dr. R.K. Bansal, Laxmi Publication (P) Ltd.*
4. *Fluid Mechanics by H.M.Raghunath, CBS Publishers and Distributers.*
5. *Fluid Mechanics & Machinery by C.S.P.Ojha, R.Berndtsson and P.N.Chandramauli, Oxford Publishers, Delhi*

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III SEMESTER

3CEU03: CIVIL ENGINEERING MATERIALS (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course. **Stones:** Source and types of stones, various standard test on building stones including compressive strength, water absorption, durability, impact value, tensile strength. Identification, Selection criteria and uses of common building stones. Dressing of stones.	**8**
Clay Products: Manufacturing of Bricks. Types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test. Types of Tiles, Standard tests for tiles as per IS code such as water absorption, tolerance, impact value, glazing. Fly Ash: Properties, classification, use of fly-ash in manufacturing of bricks & cement.	**8**
Cement & Lime: Raw materials, chemical composition and manufacturing process of cement. Basic compounds (Bouge's compounds) of cement and their role, types of cement. Setting and hardening of cement, physical properties of cement, Various standard tests on Portland cements, as per IS code including consistency, setting time, fineness, soundness and strength.	**5**
Lime: Classification as per IS, Manufacturing process, properties, standard tests of lime. Use of lime in construction. Gypsum, properties and use, Plaster of Perris.	**3**
Mortar and Plaster: types of sand, bulking of sand, tests for sand, classification, mortar preparation methods**:** Functions and tests & their uses in various types pointing & plastering.	**3**
Timber & Steel: Definitions of related terms, classifications and properties, defects in wood, conversion of wood, seasoning, preservation, fire proofing, Ply woods, fiber boards,. Steel: properties, types mild steel and HYSD steel and their use, common tests on steel. various types of paints and Varnishes; white wash and distempers and their application. .	**5**
Environmental Friendly Building Material: Concept of embodied energy of materials, energy used in transportation and construction process. Natural material like bamboo, rammed earth, stones, stabilized blocks; supplementary cementious materials like blast furnace slag, silica fume, rice husk ash; building materials from agro and industrial wastes.	**5**
Miscellaneous: Properties, types and uses of glass, aluminium, Asbestos, G.I., plastics in construction.	**3**
TOTAL	**40**

Suggested Readings:

1. *Building Materials by Prabin singh; S.K.Kataria & Sons., 2012*
2. *"Affordable Housing" by B.N. Moolchandani, Published by Indian Building Congress, Delhi.*
3. *Building Materials:Products, Properties and Systems by Ghambir,Tata Mc Graw Hill, Delhi*
4. *Construction Materials: Their nature & Behaviour by J.M. Illston; E& FN Spon*
5. *Building Materials by S. Duggal; New Age International Publishers.*
6. *Materials for Civil and Construction Engineers, by Michale, S .Mamlouk and Jhon P.Zaniewski, Pearson Noida.*

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III SEMESTER

3CEU04: CONSTRUCTION TECHNOLOGY (L–3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course. **Building Requirements & Construction System:** Building components, their functions and requirements, types of construction, load bearing construction and framed structure construction. Lift slab construction. Prefabricated/precast construction; advantages & disadvantage of prefabrication.	2
Temporary structures: Types & methods of shoring, underpinning and scaffolding.	1
Foundation & Site Preparation: Purpose, types of foundation, depth of foundation, Sequence of construction activity and co-ordination, site clearance, marking, foundation plan,	2
Brick and Stone Masonry: Basic principle of sound masonry work, different types of bonds, relative merits merit and demerits of English, single Flemish and double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry	4
Damp Proofing: Causes of dampness, effects of dampness methods and material for damp proofing DPC treatment in buildings, methods and materials for anti-termite treatment. **Joints:** Requirements, types and material used, construction details. Grouting of Joints of Precast Reinforced Concrete Structures.	3
Arches and Lintels: Terms used, types of arches and their construction detail, types of lintels and constructions. thin precast RCC lintels in Brick walls. **Partition Wall :** Types, purpose and use of partition wall.	3
Stairs : Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, lifts and lamps.	3
Fabrication and Erection Work: Fabrication of Structural steel at slopes and sites, Handling and transportation of units to be erected, Erection of Fabricated steel structures, Prefabricated/precast construction; relative advantages & disadvantage and various precast units & Erection of Precast Reinforced Concrete Structures.	2
Ground & Upper Floor: Floor components and their junctions, selection of flooring and floor types, construction details of ground and upper floors, merits and demerits	3
Roof and Roof Covering: Purposes, classification of roofs, terms used, types of pitched roofs, trussed roofs especially king port, queen port, steel roof trusses, details of steel roof trusses, method of construction, roof covering materials for pitched roofs. Thin R.C. ribbed slab for floors & roofs. Precast R.C. plank flooring/roofing.	4
Advance Construction Equipment: Different types of construction equipment viz. Earth moving equipment & their outputs, Dewatering equipment, Pumping equipment, Grouting equipment, Pile Driving equipment, Compaction equipment, Concreting equipment.	6
Equipment Management in Construction Projects: Forecasting equipment requirements, Output and capacity of equipment, Selection of equipment, Spare-parts management, Owning Costs-investment costs, depreciation, major repair cost, Operation Cost & Its types. Investment Cost, Cost of Repairs, Overheads Cost accounting, Break-even point theory, Replacement of equipment. Maintenance management-types of maintenance, breakdown maintenance, preventive maintenance & its functions.	7
TOTAL	**42**

Suggested Readings:

1. *Construction Equipments & Management by R.L. Purifoy, Tata Mc Graw Hill.*
2. "Affordable Housing", Published by Indian Building Congress, Delhi.
3. *Construction Technology by Subir K. Sarkar & Subhajit Saraswati, Oxford University Press*
4. *Building Construction by Bindra & Arora; Dahnpat Rai & Sons.*
5. *Construction Equipments by Mahesh Verma, Metropolitan Book Co.*
6. *Construction Equipments and its Management by S.C.Sharma, Prentice Hall of India (PHI).*

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III SEMESTER

3CEU05: ADVANCED ENGINEERING MATHEMATICS (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course. **Fourier Series & Z Transform –** Expansion of simple functions in fourier series. Half range series, Change of intervals, Harmonic analysis. Introduction, Properties, Inverse Z Transform.	**7**
Laplace Transform - Laplace transform with its simple properties. Unit step function, Dirac delta function their Laplace transforms, Inverse Laplace, transform – convolution theorem, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations.	**8**
Fourier Transform - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.	**8**
Numerical Analysis: Difference operation Forward backward and central, shift and average operators and relation between them. Newton's forward and backward differences interpolation formulae. Sterling's formulae, Lagrange's interpolation formula. Numerical differentiation and integration. Trapezoidal rule, Simpson's one third and one eighth rule.	**9**
Numerical integration: Numerical integration of ordinary differential equations of first order, Picards method, Euler's method & Modified Euler's Method, Mille's method and Ranga Kutta fourth order method.	**8**
TOTAL	**40**

Suggested Readings:

1.*Engineering Maths Vol-I by Chandrika Prasad, Standard Publishers and Distributers.*

Vol-II by Chandrika Prasad, Standard Publishers and Distributers.

2.Higher Engineering Maths by Gaur & Kaul, Jaipur Publishing House.

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III SEMESTER

3CEU06: ENGINEERING GEOLOGY (L-2)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 2**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
General Geology: Branches and Scope of Geology, Types of Weathering & Geological work of natural agencies like River & Wind. Geological Time Scale. Physical Properties of Minerals.	**6**
Petrology: Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.	**6**
Structural Geology: Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities.	**5**
Engineering Geology: Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.	**6**
Remote Sensing & GIS: Application of Remote Sensing and GIS in Various fields of Civil Engineering.	**4**
TOTAL	**28**

Suggested Readings:

1. *Parbin Singh-A Text Book of Engineering & General Geology- S.K.Kataria & sons*
2. *S.K.Garg- Physical & Engineering Geology- Khanna Publishers*
3. *N Chenna Kesavulu- A Text book of Engineering Geology- Macmillan India Ltd.*
4. *M.T.Maruthesha Reddy- A Text book of Applied Engineering Geology- New Age International Publisher*
5. *Remote Sensing and GIS: B.Bhatta- Oxford Publishers*.

III SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

3CEU11: BUILDING DRAWING- I (P-3)

Credit: 2 **Max. Marks: 75 (IA:50, ETE:25)**

Building Components – To study and draw the labelled sketch of different Building Components on sheets with exposure to CAD

1. Drawing of walls
    a. Brick and Stone masonry
    b. Partition wall, cavity wall and cross section of external wall
2. Pointing, Arches, Lintels and Floors
3. Doors and Windows
4. Stairs, Cross section of Dog legged stairs
5. Roofs: Flat and Inclined (Steel)
6. Foundations for Masonry Structures and Framed Structures, Provision of Damp Proof Course

Building Planning –

1. Development of Front Elevation and Sectional Elevation from a given plan
2. Development of Plan, Front Elevation and Sectional Elevation from line diagram

III SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

3CEU12: GEOLOGY LAB (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models
    a) Structural Geological Diagrams
    b) Petrological Diagrams
    c) Engineering Geological Diagrams
6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

III SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

3CEU13: FLUID MECHANICS LAB. (P-2):

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. To verify the Bernoulli's theorem.
2. To calibrate the Venturimeter.
3. To calibrate the Orificmeter.
4. To determine Metacentrie Height.
5. To determine Cc, Cv, Cd of an orifice.
6. To determine Cd of a mouthpiece.
7. To determine Cd of a V-notch.
8. To determine viscosity of a given fluid.
9. Bye Pass.

III SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

3CEU14: MATERIAL TESTING LAB. (P-2):

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. Water absorption, Compressive Strength and Tolerance Test – Bricks
2. To Determine Compressive Strength of Timber Parallel and Perpendicular to Grain
3. Modulus of Rupture of Wooden Beam
4. Tensile strength Test – Mild Steel and HYSD bar
5. Compressive Strength of Cast Iron
6. Hardness Test – Rockwell Hardness and Brinell Hardness
7. Impact Test – Izod and Charpy
8. Fatigue Test
9. Spring Test
10. Torsion Test
11. To Study the Properties and Uses of Kota Stone and Fly Ash
12. Identification of Building Materials by Visual Inspection like sand, aggregate, lime, cement, bricks, stone

SYLLABUS

OF

IV SEMESTER

B.TECH. (CIVIL ENGINEERING)

(FOR 2018-19 ADMITTED BATCH)

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IV SEMESTER

4CEU01: STRENGTH OF MATERIALS–II (L-3 T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Torsion: Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion; Stiffness of springs, springs in series and parallel, close coiled helical springs.	**5**
Deflection of Beams: Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method. Analysis of prop cantilever structures, Analysis of Indeterminate Structure using Area moment method, Conjugate beam method	**8** **5**
Introduction to Indeterminate Structures: Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem,	**4**
Fixed Beams & Continuous Beams: Analysis of fixed beams & continuous beams by three moments Theorem and Area moment method.	**8**
Introduction to Energy Methods: Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion;. Castiglione's theorems & their applications in analysis of determinate and redundant frames up to two degree of redundancy and trussed beams; Stresses due to temperature & lack of fit in redundant frames; deflection of determinate beams, frames using energy methods	**6**
Unit Load Method & its Applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.	**4**
TOTAL	**40**

Suggested Readings:

1. *Strength of Materials & Mechanics of Structures: Vol. I by Dr. B.C. Punmia Laxmi Publications (P) Ltd.*
2. *.Strength of Material by Singer and Pytel, Harper Collins Publishers.*
3. *Elements of Strength of Materials by Timoshenko & Young, Mc Graw Hill Book Co.*
4. *Mechanics of Structures by Timoshenko & Gere, CBS Publishers and Distributers.*
5. *Mechanics of Structures Vol. I & II by S.B Junarkar, Charotar Publishing House.*

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IV SEMESTER

4CEU02: HYDRAULICS AND HYDRAULIC MACHINES (L–3, T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect.	**3**
Principle of dimensional analysis Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, resistance to motion of partially and fully submerged bodies and other simple problems. Ship model experiments.	**4**
Laminar Flow: Relation between shear & pressure gradient. Flow between plates & pipes. Equations for velocity distribution, pressure difference.	**3**
Turbulent Flow in pipes: Theories of Turbulence, Nikuradse's Experiments. Hydro dynamically smooth & rough boundaries. Laminar, Sub layer, Equations of velocity distribution and friction coefficient. Stanton Diagram, Moody's diagram.	**5**
Flow through Channels: Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Mannring and Bazin. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections.	**3**
Equations of gradually varied flow in Prismatic channels. Limitation of its applicability and assumption made in its derivation. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation	**5**
Rapidly Varied Flow: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. Broad crested weirs for channel flow: Measurement, velocity distribution in open channels, parshall flume.	**5**
Impact of Free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.	**3**
Centrifugal Pumps and Turbines: Volute and whirlpool chambers, Loses of head due to variation of discharge Manometric and Hydraulic efficiencies, Description of single and multistage pumps. Specific speed, characteristic curves. Model Test. Reaction and Impulse turbines, specific speed, Mixed flow turbines. Pelton wheel turbine, Francis turbine, propeller turbine and Kaplan turbine Efficiency, Characteristics of turbines. Basic principles of governing of turbines, Draft-tube, Selection of turbines, model tests.	**8**
TOTAL	**40**

Suggested Readings:

1. *Fluid Mechanics & Hydraulics by Dr. K.R, Arora, Standard Publishers & Distributers, Delhi.*
2. *Fluid Mechanics & Hydraulics by John F.Douglas & Lynne B. Jack, Prentice Hall Inc.*
3. *.Fluid Mechanics & Hydraulics by Dr. R.K. Bansal, Laxmi Publications (P) Ltd.*
4. *Fluid Mechanics & Hydraulics by Modi & Seth, Standard Publishers & Distributers, Delhi.*
5. *Fluid Mechanics & Machinery by C.S.P.Ojha, R.Berndtsson and P.N.Chandramauli, Oxford Publishers, Delhi*

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IV SEMESTER

4CEU03: CONCRETE TECHNOLOGY (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	1
Ingredients of Concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio and its significance. **Aggregates:** types, physical properties and standard methods for their determination.	3
Concrete: Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, methods of determination.	4
Properties of Hardened Concrete: strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate-cement interface, maturity concept.	4
NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half cell potential meter, corrosion resistivity meter, core sampling.	4
Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipment for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipment. Curing of concrete: various methods their suitability. Durability of concrete.	7
Concrete Mix Deign: ACI, IS method, quality control for concrete.	3
Admixture in Concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, their properties and effect.	6
Form Work: Requirements, their types and codal guidelines for the design. Typical formworks and shuttering/ cantering for Columns, beams, slabs, walls, arches and staircase. Slip and moving formwork.	4
Special Types of Concrete: Introduction to high strength concrete, high performance concrete, sulphate resisting concrete, under water concreting, self-compacting concrete, pumpable concrete: their salient properties and application.	4
TOTAL	40

Suggested Readings:

1. *Concrete Technology by Neville & Brooks, Pearson Education.*
2. *Concrete: Microstructure, Properties & Materials by Mehta P.K, Tata Mc Graw Hill.*
3. *Concrete Technology by M.S.Shetty, S.Chand & Co.*
4. *Concrete materials by Popovics, Standard Publishers.*
5. *Chemistry of Cement and Concrete by Peter C.Hewlett, Elsevier Butterworth Heinemann.*

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IV SEMESTER

4CEU04: SURVEYING (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENT	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Linear and Angular Measurements: Method of linear measurements, Correction to length measured with a chain/tape, Ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, Traversing with tape and compass, Correction to measured bearing, Angular measurement by theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, plotting of traverse and determining the closing error, Balancing traverse.	**12**
Levelling: Measurements of elevations methods of levelling; direct/ differential, Indirect/ Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements.	**8**
Curve Surveying: Elements Of Simple And Compound Curves, Types Of Curves, Elements Of Circular, Reverse, And Transition Curves. Method Of Setting Out Simple, Circular, Transition And Reverse Curves, Types Of Vertical Curves, Length Of Vertical Curves, Setting Out Vertical Curves. Tangent Corrections.	**5**
Tacheometry and Photogrammetry Surveying: Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetry, flight planning	**8**
Setting Out Works & Modern Field Survey Systems: Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines. Principle of E.D.M. (Electronic Distance Measurements), Modulation, Types of E.D.M., Distomat, Total station, parts of total station, advantages and application.	**6**
TOTAL	**40**

Suggested Readings:

1. *Surveying Volume I by Dr. B.C. Punamia Laxmi Publications (P) Ltd.*
2. *Plane Surveying by Dr. A.M. Chandra, New Age International.*
3. *Surveying Volume –I & II by Dr. K.R. Arora Standard Book House Delhi*
4. *Surveying & Leveling by Subramanian Oxford University Press.*
5. *Surveying Vol.1 by S.K.Duggal Tata Mc Graw Hill,Delhi.*

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IV SEMESTER

4CEU05: QUANTITY SURVEYING & VALUATION (L- 3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
l Objective, Scope and Outcome of the Course.	**1**
Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.	**8**
Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)	**8**
Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification.	**10**
Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.	**5**
Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings**.**	**8**
TOTAL	**40**

Suggested Readings:

1. *Estimating & costing by B.N.Dutta, UBS Publishers & Distributers.*
2. *Estimating Costing Specification & Valuation in Civil Engg. M .Chakroborty, Bhakti Vedanta, Book Trust, delhi.*
3. *Quantity Surveying and Valuation by S.C. Rangawala , Charotar Publishing House.*

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IV SEMESTER

4CEU06: BUILDING PLANNING (L-2)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 2**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Introduction: Types of buildings, criteria for location and site selection, site plan and its detail.	**2**
Sun Consideration : Different methods of drawing sun chart, sun shading devices, design of louvers.	**3**
Climatic and Comfort Consideration: Elements of climate, global climate, climatic zones of India, thermal comfort, bi-climatic chart,	**3**
Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.	**1**
Building Bye Laws and NBC Regulations: Objective of by-laws, regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation.	**3**
Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.	**3**
Vastu Shastra in Modern Building Planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings, school/hospital	**3**
Functional Design and Accommodation Requirements of Non Residential Buildings: viz-school buildings, rest house, primary health centers, post office etc.	**3**
Services in Buildings (A) Lighting and ventilation, doors and windows, lifts. (B) Acoustics, sound insulation and noise control. (C) Fire-fighting provisions	**6**
TOTAL	**28**

Suggested Readings:

1. *Manual of Tropical Housing and Buildings by Koenigs Berger Orient and Longman.*
2. *Building Drawing by M.G.Shah, C.M. Kala, S.Y.Patki , Tata Mc Graw Hills.*
3. *SP.41 (S&T)- Handbook on functional Requirements of Buildings Part-I*
4. *National Building Code, BIS.*
5. *Architecture Drafting and Design by Donald E. Helper, & Paul I Wallach.*
6. *Time Saver Standards for Housing and Residential Development by DE Chiara, Tata Mc Graw Hill, Delhi.*

IV SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU11: SURVEYING LAB (P-3)

Credit: 2 **Max. Marks: 75 (IA:50, ETE:25)**

1. Linear Measurement by Tape:
    a. Ranging and Fixing of Survey Station.
    b. Plotting Building Block by offset with the help of cross staff.
2. Compass Survey: Using Surveyor's and Prismatic compass
    a. Measurement of bearing of lines
    b. Adjustment of included angles of compass traverse.
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
    a. To determine the reduced levels in closed circuit.
    b. To carry out profile levelling and plot longitudinal and cross sections for road.
4. Theodolite Survey: Using Vernier Theodolite
    a. To carryout temporary adjustment of Theodolite & Measurement of horizontal and vertical angle: by method of repetition and method of Reiteration.
    b. To measure and adjust the angles of a braced quadrilateral.
5. Trigonometric Levelling: To determine the Height of an object by trigonometric levelling:
    a. By using Instruments in same vertical plane.
    b. By using Instruments in different vertical planes.
6. Tachometry Survey:
    a. To determine the tachometric constant.
    b. To determine the horizontal and vertical distance by tachometric survey.
7. To study the various electronic surveying instruments like EDM, Total Station etc.

One-week Survey Camp for topographic/ project survey/Contouring be arranged before or after Term End Exam.

IV SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU12: BUILDING DRAWING-II (P-3)

Credit: 2 **Max. Marks: 75 (IA:50, ETE:25)**

1- To plan and draw working drawing of a Residential building with following detail.

(a) Site plan

(b) Foundation plan

(c) Plan

(d) Two sectional elevations

(e) Front elevation

(f) Furniture plan

(g) Water supply and sanitary plan

(h) Electric fitting plan

2- To plan and draw a Primary Health Centre

3- To plan and draw a Primary School

4- To plan and draw a Rest House

5- To plan and draw a Post Office

6- To plan and draw a Bank

7- To plan and draw a College Library

8- To plan and draw a Cinema Theatre

IV SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU13: CONCRETE TECHNOLOGY LAB (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. Test on Cement
    a. fineness of Cement by sieving through a 90 micron I.S. Sieve.
    b. Standard Consistency
    c. Specific Gravity
    d. Initial & Final Setting Time
    e. Compressive Strength
    f. Soundness of cement by Le-chatelier apparatus
2. Test on Aggregates:
    a. Specific gravity of fine aggregate (sand) by Pycnometer.
    b. Bulking of fine aggregate
    c. Specific gravity of Coarse aggregate
    d. Sieve Analysis of Coarse and Fine Aggregates
3. To design concrete mix of M-20 grade without admixture in accordance with I S recommendations
4. To determine the workability of given concrete mix by slump test, Compaction Factor Test
5. To determine the Compressive Strength and Flexural Strength of Concrete.
6. To design concrete mix of M-40 grade with admixture in accordance with I S recommendations.
7. To determine the optimum dose of super plastsizers by by Flow table test..
8. To determine the Elastic Modulus of Concrete.
9. To determine the Permeability of Concrete.
10. NDT

IV SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU14: HYDRAULICS AND HYDRAULIC MACHINES LAB (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine Cd of Broad crested wier.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given flume.
7. To plot characteristics curve of hydraulic jump.
8. To plot characteristics curve of Pelton Wheel.
9. To plot characteristics curve of Centrifugal Pump.

SYLLABUS

OF

V SEMESTER

B.TECH. (CIVIL ENGINEERING)

(FOR 2018-19 ADMITTED BATCH)

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

V SEMESTER

5CEU01: THEORY OF STRUCTURES (L-3, T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Analysis of Structures: Analysis of Statically Indeterminate Structures using Slope-deflection method. Moment-distribution method applied to continuous beams and portal frames with and without inclined members	**11**
Column Analogy Method for indeterminate structures, determination of carry over factor for non-prismatic section.	**6**
Approximate Methods for Lateral Loads: Analysis of multi-storey frames by portal method, cantilever method & factor method.	**5**
Influence Line Diagram & Rolling Load: ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.	**11**
Unsymmetrical Bending: Definition, location of NA, computation of stresses and deflection, shear centre and its location,	**6**
TOTAL	**40**

Suggested Readings:

1. *Strength of Materials & Mechanics of Structures: Vol. I by Dr. B.C. Punmia Laxmi Publications (P) Ltd.*
2. *Advanced Structural Analysis by Dr. A.K. Jain, Nem Cahnd and Brothers, Roorkee.*
3. *Mechanics of Structures by Timoshenko & Young, Mc Graw Hill Book Co.*
4. *Mechanics of Structures Vol.-I by Junarkar & Shah, Charotar Publishing House.*
5. *Theory of Structures by Jangid & Negi, Tata Mc Graw Hill.*
6. *Structural Analysis by Ghali & Neville, E&FN,Spon.*
7. *Structural Analysis by Hibbler R.C., Pearsons*

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V SEMESTER

5CEU01: TRANSPORTATION ENGINEERING (L-3, T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison. **Highway Planning:** Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment.	**7**
Highway Geometric Design: Cross Sectional Elements, Sight Distances – definition and analysis of SSD and OSD, Design of Horizontal Alignments, Design of Vertical Alignments – Gradients, Vertical curves. Recommendations Indian Road congress code of Practice.	**6**
Highway Materials and Construction: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Aggregates and Binders, Bituminous Emulsions and Cutbacks, Bituminous mix design and specifications, Methods of constructing different types of roads, Equipment for highway construction of rigid and flexible pavements	**6**
Structural Design of Highway Pavements: Design of Flexible Pavements by CBR method. Design as per guidelines of relevant Indian Road congress code of Practice, Maintenance of roads.	**6**
Railway Engineering: Types and Selection of Gauges, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings. Coning of Wheels, Creep, Wear, failures in Rails, Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Signalling. **Points and Crossings:** Types of Turnouts, Points or Switches, layout Plans of different types of Crossings, Geometric Design: Gradient and Grade Compensation, Super elevation and cant, cant deficiency,	**7**
Airport Engineering: Airport Classifications, Factors in Airport Site Selection, **Planning and Design of Airport**: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway, Length, Geometric Design of Runways, Layout of Taxiways, Geometric Standards, Exit or Turnaround Taxiways, Apron and Hangers.	**7**
TOTAL	**40**

Suggested Readings:

1. *Highway Engineering by Khanna SK & CG Justo, Nem Chand and Brothers, Roorkee.*
2. *Highway Engg. by L.R. Kadiyali, Khanna Tech Publications, Delhi.*
3. *Specification for Roads & Bridges by Ministry of Road Transports & Highways and Indian Road Congress.*
4. *Railway Engineering by Satish Chandra and M.M Agarwal, Oxford University Press, Delhi.*
5. *Railway Engineering by Sexena S.C. and Arora S.P, Dahnpat Rai Publishers, Delhi.*
6. *Airport Engineering by Rangwala,Charotar Publishing House.*

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V SEMESTER

5CEU03: ENVIRONMENTAL ENGINEERING-I (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	1
General: Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview.	2
Water Demand: Design flow, design periods, design population, factors affecting water consumption, variation in water demand, design capacities for various water supply components.	5
Source of Water and Collection Works: Alternative sources i.e. rain, surface and ground water, Assessment of yield and development of the source.	4
Quality of Water: The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards.	4
Transmission of Water: Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps station.	3
Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes (theory and application): aeration, solids separation, settling operations, coagulation, softening,	5
Advanced Treatment of Water: filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles.	8
Distribution of Water: Method of distributing water, distribution reservoirs, distribution system, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems, pumping required for water supply system.	5
Plumbing of Building for Water Supply: Service connections, fixture units, simultaneous flow, design of plumbing system.	3
TOTAL	40

Suggested Readings:

1. *Water Supply by S.K. Garg, Khanna Publishing Co.*
2. *Environmental Engineering by Peavy, H.S., Rowe D.R. and Techobanoglous, Mc Graw Hill, Book Company.*
3. *Manual of Water Supply and Water Treatment, Ministry of Urban Development, Govt.of India.*

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V SEMESTER

5CEU04: GEOTECHNICAL ENGINEERING – I (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Soil and Soil-mass Constituents: water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter-relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems.	**7**
Clay Mineralogy: Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, clay structure; basic structure, mineral structures, structures of Illite Montmorillonite and kaolinite and their characteristics.	**4**
Soil Permeability: Soil water absorbed, capillary and free water, Darcy's law of permeability of soil and its determination in laboratory. Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.	**4**
Stresses in Soil-mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon	**3**
Seepage and Seepage Pressure: Laplace's equation for seepage. Flow net and its construction. Uplift pressure, piping, principle of drainage by electro Osmosis, phreatic line, Flow net through earth dam.	**5**
Mohr's Circle of Stress: shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Tri-axial and unconfined compression test apparatuses. Typical stress-stain curves for soils. Typical failure envelopes for cohesion less soils and normally consolidated clay soils.	**8**
Soil Compaction & Stablization: l Principles of soil compaction, Laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction, compaction equipment. Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen.	**8**
TOTAL	**40**

Suggested Readings:

1. *Basic and applied Civil Mechanics by Rajan & Rao, New Age International Publishers.*
2. *Soil Mechanics & Foundation Engineering by Arora K.R, Standard Publishers and Distributers, Delhi.*
3. *Soil Engineering in Theory & Practice by Alam Singh, CBS Publishers and Distributers, Delhi.*
4. *Geotechnical Engineering—Principles and Practices, Coduto PHI Publisheres.*
5. *Principles of Geotechnical Engineering by Braja M. Das, CENAGE Learning New Delhi.*

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V SEMESTER

5CEU5.1: GEOMATICS AND SURVEYING (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Trigonometric Levelling: Trigonometric levelling, Objects accessible and non-accessible, Determination of levels object- when two instrument positions in same and different vertical planes**.** Curvature, Refraction and **A**xis Signal corrections, Determination of difference in elevations of points by trigonometric levelling by single observation method (angle of elevation, angle of depression), reciprocal method.	**3** **4**
Curve Surveying: Elements of circular (Simple, compound and reverse) curves, transition curves, degrees of curve, Linear and angular Methods of setting out circular and transition curves.	**8**
Triangulation: Merits and demerits of traversing, triangulation and trilateration. Grades of triangulation, Strength of figure, field procedure of triangulation. Reconnaissance and selection of triangulation stations. Indivisibility of stations and calculation of the heights of towers. Equipment needed for base line measurement, corrections to base line. Satellite station and base line extension.	**8**
Errors in Surveying: Classification of errors in surveying. The probability curve, its equation and properties, theory of least squares, weight, most probable value, probable errors, standard errors. Normal equation correlates.	**4**
Adjustment of Triangulation Figures: Adjustment of levels. Adjustment of triangulations figures, Braced quadrilateral Triangle with central, station. Approximate and method of least squares for figure adjustment, Trilateration.	**4**
Field Astronomy: Definitions of terminology used in Astronomy, Co-ordinate Systems. Relationships between different Co-ordinate systems. Astronomical Triangle, Napier's Rule. Different methods of determination of Azimuth. Electronic distance measurement and use of Total station.	**8**
Total	**40**

Suggested Readings:

1. *Surveying – Vol. I &II by K.R. Arora Satandard Book House,Delhi.*
2. *Surveying Vol. 2 & 3 by B C PunmiaLaxmi Publications, Delhi.*
3. *Advance Surveying by Sathees Kumar, R.Sathis Kumar , N. Madhu, Pearson Education*
4. *Plane and Geodetic Surveying Vol.I&II, BY David Clark, CBS Publishers and Distributers.*
5. *Surveying Vol.2 by S.K.Duggal, Tata Mc Graw Hill, Delhi.*
6. *Advance Surveying by A.M.Chandra, New Age Inetrnational, Delhi.*

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V semester

5CEU5.2: MODERN CONCRETE TECHNOLOGY (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Concrete Production: Difference in mix proportioning for **v**ibrator compacted concrete, pumpable and roller compacted concrete. Considerations in a plant operation in ready mixed concrete (RMC). Different types of mixers, transportation systems and pumps in RMC, their selection criterion	**4**
Rheology of Concrete: Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, related standards including slump flow test, v funnel test, U box test, J Ring test, Stability test, L Box test, rheometer test etc.	**3**
Chemical admixtures in Concrete: **Chemical:** Applications of accelerators, importance of chloride free admixtures, Typical dosages and applications, Case studies of use in tunnels and metros etc. Application of Retarders in RMC applications, hot weather concrete etc. High range water reducing admixtures: Naphthalene and PCE based. Mechanism, Principle of working. Application procedure, Shelf life, Outline of different commercial types available in Indian market.	**4**
Flyash in Concrete: Fly-ash: Physical and chemical properties, IS 3812 and ASTM specifications for use in cement and concrete. Properties of typical fly-ashes available in the country. Graded fly-ash, its applications.	**2**
Ground Granulated Blast Furnace Slag (GGBFS): Properties**,** Indian standards, Applications. **Ultra fine powders:** Micro Silica, Metakaolin, Limestone, Calcium carbonate powders etc: Properties, role in cement concrete, IS specifications, and **a**pplications.	**3**
Strength of Concrete: Factors affecting compressive strength, behaviour of concrete under uniaxial, biaxial and tri-axial stress states, Split Tensile strength and modulus of rupture -test methods and empirical formulae for their estimation. Related stipulations of IS.	**4**
Microstructure of Concrete: Interfacial transition zone, hydration kinetics, hydrated cement paste (hcp), ettringite, calcium hydroxide, presence of micro-cracks in concrete mass - their characteristics and significance on performance of concrete, **Penetrability of Concrete**: Permeability, sorptivity and diffusion in concrete- test methods and significance.	**4**
Durability of Concrete: Physical and chemical processes, Methods of tests like Resistivity, RCPT, etc- case studies of performance based design including parameters like RCPT, permeability etc.	**4**
Specific purpose concretes and cement based composites: Self Compacting Concrete: Mix proportioning, EFNARC guidelines. Fibre cements, fibre reinforced cement based composites, including High performance fibre based cementitious composites, mass concrete and polymer concrete etc.- materials, production and application areas.	**5**
High performance concrete- performance characteristics in fresh and hardened states, production precautions - case studies of use of HPC in India: Metro construction, Mumbai – Worli Sea link project, atomic power projects, Hydro-electric power projects etc.	**3**
Green and Sustainable Concrete: Means to reduce carbon foot print, embodied energy, in **c**oncrete practices. Recycled aggregates- properties and processing. Properties of concretes with recycled aggregates.	**3**
TOTAL	**40**

Suggested Readings:

1. *Properties of Concrete by A.M. Neville, Longman Publishers.*
2. *Concrete Technology by M.S. Shetty, Dahnpat Rai & Sons.*
3. *Concrete Technology by Nevillee & Brooks, Pearson Education.*
4. *Concrete Microstructure P.K. Metha, Tata Mc Graw Hill.*
5. *Concrete Technology- A. S. Santhakumar, Oxford University Press*
6. *Handbook of Concrete Science and Engineering- V. S. Ramchandran*

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V SEMESTER

5CEU5.3: APPLICATION OF NUMERICAL METHODS IN CIVIL ENGINEERING (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Errors & Approximations in Numerical Computation: Introduction to Mathematical Modeling and Engineering Problem Solving. Decimal & Binary Number system. Accuracy, Precision and Significant Digits. Errors and their types.: absolute and relative errors, approximations and round off errors, truncation errors and Taylor's series. Propagation of errors.	**7**
Roots of Equations: Iterative processes and their Convergence. Existence of roots in engineering practices & their geometrical representation. Roots of the equations by: Graphical Method, Method of Successive Substitution, Bisection Method, False Position Method, Newton-Raphson Method, Secant Method, Regula Falsi Method. Application to simple civil engineering problems.	**8**
Matrices and Determinants: Their types and basic operations. Rank of a matrix. Solution of Linear system of equations by Direct methods: Cramer's Rule, Gaussian elimination method, Gauss-Jordan Method and Cholesky Method. Application to simple civil engineering problems.	**8**
Iterative Methods for Solving Linear System of Equations: Jacobi Method, LU decomposition and Matrix inversion, Gauss Seidel method. Application to simple civil engineering problems.	**8**
Interpolation and Curve Fitting: Newton's Forward Difference, Newton's Backward Difference, Newton's Central Difference, Newton's Divided Difference, Lagrangian Interpolation, Hermitian Interpolation, Method of least square. Application to simple civil engineering problems.	**8**
TOTAL	**40**

Suggested Readings:

1. *Introductory Methods of Numerical Analysis, Sastry S.S., Prentice Hall India*
2. *Numerical Methods for Engineering and Scientific Computation, Jain and Jain, New Age International Pvt. Ltd. New Delhi.*
3. *Engineering Statistics, Bowker, A.H. and Liberman G.J., Prentice Hall.*
4. *Probability and Statics in Engineering, Hines, John Willey and Sons.*
5. *Applied Statistics and Probability for Engineers, Montgomery, John Wiley and Sons.*
6. *Numerical Methods for Engineers by S.C. Chapra & R.P. Canale, Tata McGraw Hill*
7. *Numerical Methods in Science and Engineering by S. Rajasekaran, Wheeler Publishing*

V SEMESTER

5CEU6.1: ENERGY SCIENCE AND ENGINEERING (L-2)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 2**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course.	**1**
Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment	**5**
Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems	**6**
Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability	**5**
Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.	**7**
Engineering for Energy Conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings; Identification of energy related enterprises	**4**
TOTAL	**28**

Suggested Readings:

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5CEU6.2: DISASTER MANAGEMENT (L-2)

Exam Hrs. 3 Max. Marks: 150 (IA:50, ETE:100) Credit: 2

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Introduction: Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Natural and Manmade Disasters, Disaster and Development, and Climate Change. Professional ethical aspects.	**5**
Types of Disasters, their occurrence/ causes, impact and preventive measures:	
Geological Disasters: earthquakes, landslides, tsunami, mining;	**4**
Hydro-Meteorological Disasters: floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves.	**2**
Biological Disasters: epidemics, pest attacks, forest fire.;	**2**
Technological Disasters: chemical, industrial, radiological, nuclear.	**2**
Manmade Disasters: building collapse, rural and urban fire, road and rail accidents.	**2**
Disaster profile of Indian continent, Mega Disasters of India and Lessons Learnt. Risk mapping.	**3**
Disaster Management Cycle: Disaster Management Cycle and its components: Pre disaster and post disaster, Paradigm Shift in Disaster Management. .	**3**
Disaster management system in India: Disaster Management Act 2005, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter- Governmental Agencies.	**4**
TOTAL	**28**

Suggested Readings:

1. *Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), LondonDynamics of Structures by Clough & Penzin, Mc Graw Hill Book Co.*
2. *Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi.*
3. *Earthquake Tips by C.V R. Murthy, IIT Kanpur.*
4. *An overview on natural & man-made disasters and their reduction, R K Bhandani, CSIR, New Delhi*
5. *Encyclopedia of disaster management, Vol I, II and IIIL Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006*
6. *Disasters in India Studies of grim reality, Anu Kapur & others, 2005, 283 pages, Rawat Publishers, Jaipur*
7. *Management of Natural Disasters in developing countries, H.N. Srivastava & G.D. Gupta, Daya Publishers, Delhi, 2006, 201 pages*
8. *Disaster Management Act 2005, Publisher by Govt. of India*
9. *Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management*
10. *National Disaster Management Policy, 2009, GoI*

V SEMESTER

5CEU6.3: CONSTRUCTION EQUIPMENT AND MANAGEMENT (L-2)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 2**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Construction Equipment Management: Identification – Planning - Equipment Management in Projects - Maintenance Management – Replacement- Cost Control of Equipment - Depreciation Analysis – Safety Management.	**5**
Equipment for Earthwork Fundamentals Of Earth Work Operations - earth moving operations - types of earth work equipment - tractors, motor graders, scrapers, front end waders, earth movers.	**5**
Other Construction Equipment: equipment for dredging, trenching, tunneling, drilling, blasting - equipment for compaction - erection equipment - types of pumps used in construction - equipment for dewatering and grouting – foundation and pile driving equipment – equipment for demolition.	**6**
Materials Handling Equipment forklifts and related equipment - portable material bins – conveyors – hauling equipment.	**5**
Equipment for Production of Aggregate and Concreting Crushers – feeders - screening equipment - handling equipment - batching and mixing equipment - hauling, pouring and pumping equipment – transporters.	**6**
TOTAL	**28**

Suggested Readings:

1. L.M.Prasad, Principles and Practice of Management, Sultan Chand and Sons.
2. V.P.S.Rao and P.S.Narayana, Principles of Management.
3.Construction equipments and management by SC Sharma; Khanna Publishers
4.Construction planning, equipment and methods by R.Purifo; Mc-GrawHill

V SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

5CEU11: GEOTECHNICAL ENGINEERING LAB-I (P-3)

Credit: 2 **Max. Marks: 75 (IA:50, ETE:25)**

1. Grain size distribution by Sieve Analysis
2. Determination of water content by Pycnometer.
3. Determination of specific Gravity by Pycnometer.
4. Determination of liquid limit by Casagrande's apparatus.
5. Determination of liquid limit by cone penetrometer.
6. Determination of plastic limit
7. Determination of shrinkage limit
8. Determination of field density by core-cutter
9. Determination of field density by sand replacement method
10. Determination of compaction properties by standard Proctor Test Apparatus
11. Determination of C-Ø values by Direct Shear Test Apparatus
12. Determination of Unconfined Compressive Strength by unconfined compression Test Apparatus

TYPICAL LIST OF EXPERIMENTS FOR LABS

5CEU12: ENVIRONMENTAL ENGINEERING LAB -I (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. To determine the pH of the given sample of water.
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water sample.
4. To determine the Total Dissolved Solids of the given water sample.
5. To find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8. To determine alkalinity of the given water sample.
9. To find out acidity of the given water sample.
10. To determine hardness of the given water sample.
11. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings.

V SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

5CEU13: ROAD MATERIAL TESTING LAB (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. Aggregate Impact test
2. To determine the flakiness index & Angularity number test of given sample of aggregate.
3. To determine fineness modulus of a given sample of coarse aggregate.
4. Los angles abrasion test
5. Aggregate crushing value test
6. Specific gravity and water absorption test of aggregate.
7. Standard tar viscometer test
8. To determine the elongation index for given sample of aggregate.
9. Ductility test
10. To determine the softening point for give sample of bitumen.
11. Marshell stability test
12. Float test

TYPICAL LIST OF EXPERIMENTS FOR LABS

5CEU14: STRUCTURAL ENGINEERING LAB (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. Study of friction, screw jacks, winch crabs etc.
2. Deflection of a truss
3. Clark-Maxwell reciprocal theorem with truss
4. Funicular polygon for flexible cable
5. Analysis of redundant frame
6. Deflection of curved members
7. Buckling of columns
8. Clark-Maxwell reciprocal theorem with simply supported beam
9. ILD for deflection in a steel beam using unit load method
10. ILD for support reaction using Muller-Breslau Principle
11. Unsymmetrical bending.
12. Two hinged and three hinged arches.

SYLLABUS

OF

VI SEMESTER

B.TECH. (CIVIL ENGINEERING)

(FOR 2018-19 ADMITTED BATCH)

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

VI SEMESTER

6CEU01: DESIGN OF CONCRETE STRUCTURES – I (L-3, T-1)

(Design procedure shall be conforming to IS 456-2000)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Objective and fundamental concepts of design of RC members, Types and function of reinforcement. Introduction to various related IS codes. Design Philosophies: Working stress, ultimate strength and limit states of design. Analysis and Design of singly reinforced rectangular beam section for flexure using Working Stress Method.	**6**
Beams: Analysis and design of singly and doubly reinforced rectangular beams: simply supported, fixed & continuous beams: Analysis and design of flanged beams for flexure using Limit State Method. Limit state of serviceability for deflection, control of deflection as per codal provisions of empirical coefficients.	**9**
Limit State of Collapse in Shear: analysis and design of prismatic sections for shear using LSM. **Limit State of Collapse in Bond**: concept of bond stress, anchorage length and development length, curtailment of reinforcement as per codal provisions.	**6**
Slabs: Analysis and design of one way slab and two way slabs (with different support conditions) using LSM as per code. Detailing of reinforcement.	**9**
Columns: Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of uni-axially eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns. **Column Footings**: Analysis and design of Isolated column footing and combined footing for two columns (without central beam) for axial loads using LSM.	**9**
TOTAL	**40**

Suggested Readings:

1. *Illustrated Reinforced Concrete Design by Karve & Shah; Standard Publishers, Delhi.*
2. *Limit State Design of Reinforced Concrete by Verghese P.C.; PHI Delhi.*
3. *Limit State Design by Dayaratnam; Oxford and IBH Publishing House.*
4. *Reinforced Concrete : Limit State Design by A.K.Jain; Nem Cahnd and Brothers, Roorkee.*
5. *Reinforced Concrete Structural Elements by P Purushothaman; Mc Graw Hill*
6. *Reinforced Concrete Fundamentals by Phil M. Ferguson; Prentice Hall*
7. *Design of reinforced Concrete by Jack C. Cormac & James K. Nelson; C.H.I.P.S.*
8. *Reinforced Concrete Design by Wang & Salmon; Harper & Row.*
9. *Design of Concrete Structures by Nilson & Winter; Mc Graw Hill*

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

VI SEMESTER

6CEU02: DESIGN OF STEEL STRUCTURES – I (L-3, T-1)

(Design procedure shall be conforming to IS 800-2007)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Introduction: Types of steels and their broad specifications. **Plastic Analysis:** Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor. Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including moment- rotation.	**7**
Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings. **Tension Members**: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members.	**8**
Compression Member: Types of buckling. Column buckling curves, Imperfection factor, Buckling curves for different cross sections. Design of compression member; Axially loaded compression members including angle section design: single and in pair, built up columns, design of lacings and battens.	**8**
Beams: Design of beams: simple and compound sections, main and subsidiary beams and their connections. Laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.	**8**
Member Design under Combined Forces: Compressive load and uniaxial moment. tension and uniaxial moment **Column Bases**: Design of column bases, Slab base, gusseted base for axial and eccentric compressive load. Grillage foundation design.	**8**
TOTAL	**40**

Suggested Readings:

1. *Design of Steel Structures by N. Subramanian, Oxford University Press.*
2. *Limit state Design of Steel Structures: S K Duggal, TMH publication*
3. *Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.*
4. *Design of Steel Structures by V.L. Shah, Structures Publications.*

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

VI SEMESTER

6CEU03: ENVIRONMENTAL ENGINEERING – II (L-3)

Exam Hours: 3 Max. Marks: 150 (IA: 50, ETE: 100) Credit: 3

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
General: Terms: sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmental engineer, historical overview. **Sewage Characteristics:** Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards.	**8**
Collection of Sewage: Systems of sewerage, Separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of storms water, rational method, shapes of sewer, Hydraulic design of sewers: diameter self cleansing velocity and slopes, construction and testing of sewer line, Sewer materials, joints and appurtenances, Sewage pumping and pumping stations, maintenance of sewerage system.	**8**
Sewage Treatment: Various units: their purpose, sequence and efficiencies, preliminary treatment, screening and grit removal units, oil and grease removal, primary treatment, secondary treatment, activated sludge process, trickling filter, sludge digestion and drying beds, stabilization pond, septic tank, soakage systems, recent trends in sewage treatment, advanced wastewater treatment :nutrient removal, solids removal.	**8**
Wastewater Disposal and Reuse: Disposal of sewage by dilution, self-purification of streams, sewage disposal by irrigation sewage farming, waste waters reuse. **Plumbing for Design of Buildings:** Various systems of plumbing – one pipe, two pipes, single stack, traps, layout of house drainage.	**8**
Air and Noise Pollution: Air quality, Emission standards, vehicular pollution, Effect of air pollution on human health, Noise Pollution, global effect of air and noise pollution, green house effect, acid rain etc.	**7**
TOTAL	**40**

Suggested Readings:

1. *Environmental Engineering II by B.C. Punmia, Arihant Publishers, Jodhpur.*
2. *Sanitary Engineering by SK Garg, Khanna Publishing Co.*
3. *Manual on Sewage and Sewage Treatment Ministry of Urban Development Govt. of India.*
4. *Water and Waste Water Engineering by Fair, G.M., Geyer G.C. and Okun D.A, Ann Arbor Sc.Publishing.*

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

VI SEMESTER

6CEU04: GEOTECHNICAL ENGINEERING – II (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

Max. Marks: 100 **Exam Hours: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course **Stresses in Soil Under Surface Loading**: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Horizontal and shear stresses due to concentrated loads. Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram. Vertical stresses at point under line load and strip load. Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart, Fensk's Chart. Pressure bulb and its significance in Foundation exploration. Contact pressure below foundations.	3 3
Review of the Chapter	1
Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy. **Consolidation:** Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Pre-consolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement.	2 3 2
Review of the Chapter	1
Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability analysis of finite slopes by Swedish and Friction circle method. **Stability Analysis:** Stability Analysis by Taylor's stability number, Taylor stability number curves. Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction. Bishop's method of stability analysis.	2 4
Review of the Chapter	1
Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories of earth pressure. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill. Earth pressure on cantilever sheet piles Stability analysis of retaining walls	2 3 2
Review of the Chapter	1
Bearing Capacity of Soils: Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity. Plate load and penetration tests for determining bearing capacity. Introduction to pile, well and machine Foundations.	2 3 2
Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration, Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples. Geophysical methods of investigations	2
Review of the Chapter	1
TOTAL	**40**

Suggested Readings:

1. *Engineering in Theory & Practice Vol. I by Alam Singh, CBS Publishers and Distributers, Delhi. (2003)*
2. *Soil Mech. & Foundation Engineering by K.R. Arora, Standard Publishers and Distributers, Delhi.*
3. *Geotechnical Engineering by Purushottam Raj, Tata Mc Graw Hills, Delhi.*
4. *Soil Mechanics in Engineering Practices by Terzaghi & Peck, John Wiley & Co.*
5. *Theory and Practice Of Foundation Design by Som and Das, PRENTICE Hall of India Delhi (PHI).*
6. *Soil Mechanics in Engineering and Practice by Terzaghi, CBS Publishers and Distributors.*
7. *Getechnical Engineering by Gulhati and Datta, Tata Mc Graw Hill, Delhi.*
8. *An Introduction to Geotechnical Engineering by Robert D.Holtz, William D. Kovacs, Thomas C. Sheahan, Pearson Education Delhi.*
9. *Design Aids in Soil Mechanics and Foundation Engineering by S.R.Kaniraj, Tata Mc Graw Hill, Delhi.*

VI SEMESTER

6CEU5.1: ANALYSIS OF STRUCTURE (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Arches: analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.	**7**
Cable and Suspension bridges: Analysis of cables with concentrated and continuous loading, analysis of two & three hinged stiffening girder.	**8**
Kani's Method: Analysis of beams and frames with & without sway by Kani's method	**8**
Tension Coefficient Method: Analysis of determinate space trusses by tension coefficient method.	**6**
Matrix Methods of Structural Analysis: Introduction to matrix method, Force displacement relation, flexibility and stiffness coefficients, relation between flexibility and stiffness matrices, system approach of flexibility method and stiffness method, coordinate transformation matrix, rotation matrix, element and global stiffness matrix for pin jointed structures and beam element in 2D only.	**10**
TOTAL	**40**

Suggested Readings:

1. *Strength of Materials & Mechanics of Structures: Vol. I by Dr. B.C. Punmia Laxmi Publications (P) Ltd.*
2. *Advanced Structural Analysis by Dr. A.K. Jain, Nem Cahnd and Brothers, Roorkee.*
3. *Mechanics of Structures by Timoshenko & Young, Mc Graw Hill Book Co.*
4. *Mechanics of Structures Vol.-I by Junarkar & Shah, Charotar Publishing House.*
5. *Theory of Structures by Jangid & Negi, Tata Mc Graw Hill.*
6. *Structural Analysis by Ghali & Neville, E&FN,Spon.*
7. *Structural Analysis by Hibbler R.C., Pearsons*

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

VI SEMESTER

6CEU5.2: SOLID AND HAZARDOUS WASTE MANAGEMENT (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Introduction to scope, objective and outcome of subject.	**1**
General: Problems associated with Solid Waste Disposal. **Generation of Solid Waste:** Goals and objectives of solid waste management, Classification of Solid Waste. Solid Waste Generation, Factors Influencing Generation of Solid Waste, Characteristics of Solid Waste, Analysis of Solid Waste.	**7**
Onsite Handling, Storage and Processing: Public Health and Aesthetics, Onsite Handling, Onsite, Storage, Dust bins, Community Containers, Container Locations, On-site Processing Methods.	**8**
Solid Waste Collections, Transfer and Transport: Collection Systems, Equipment and Labor requirement, Collection Routes, Options for Transfer and Transport Systems.	**8**
Processing and Disposal Methods: Processing Techniques and Methods of Disposal, Sanitary land filling, Composting and Incineration, Bioremediation.	**8**
Recovery of Resources, Conversion, Products and Energy: Material Recovery, Energy Generation and Recovery Operation, Reuse in other industry. **Industrial Solid Waste:** Nature, Treatment and Disposal Methods.	**8**
TOTAL	**40**

Suggested Readings:

1. *Solid Waste Engineering Principles and Management Issues by G. Technobanogious H.Theisen & R.Blssen, Mc Graw Hill Book Co.*
2. *Solid Waste Management by C.L.Mantell, Mc Graw Hill Book Co.*
3. *Solid Waste Management in Developing Countries by Bhide& Sunrashen PHI.*

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VI SEMESTER

6CEU5.3: ROCK ENGINEERING (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Engineering Classification of Rocks: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock quality classification, rock structure rating concept, RMR classification, Q classification. Inter relation between Q and RMR, prediction of ground condition and support pressure. Effect of Tunnel size on support pressure.	**7**
Engineering Properties and Laboratory Tests on Rocks: Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability. Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.	**8**
Insitu Tests on Rocks: Necessity of Insitu test, Plate load test for deformability, Shear test, Test for internal stresses – flat Jack, pressure meter test.	**4**
Jointed Rocks: Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.	**4**
Strength of Rocks in Unconfined Condition: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Hoek Criteria, Barton Methodology.	**4**
Strength of Rocks in Confined Condition: History of Hoek and Brown Failure Criterions and latest methodology, Parabolic Strength Criteria.	**4**
Grouting and Rock Bolting: Grouting materials, Grouting operations, methods of Grouting, Mechanism of Rock Bolting, Principal of design.	**4**
Bearing Capacity of Rocks: Bearing capacity of intact rocks, jointed rocks, IS Code methodology, Singh and Rao Method and latest methodologies.	**4**
TOTAL	**40**

Suggested Readings:

1. *Rock Engg. For Engineers by B.P. Verma , Khanna Publishers.*
2. *Rock Engg. By Bhawani Singh, Elsevier Science Ltd.*
3. *Foundation on Rocks by Duncan C.Wyllie, Spon Press.*
4. *Engineering in Rock for Slopes, Foundation and Tunnels, by Ramamurthy, PHI Delhi.*
5. *Latest IS Codes on Rocks*

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VI SEMESTER

6CEU6.1: REPAIR AND REHABILITATION OF STRUCTURES (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

Max. Marks: 100 **Exam Hours: 3**

Contents	Hrs.
Objective, Scope and Outcome of the Course	**1**
Deterioration of Concrete Structures: Penetrability of concrete- permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfate attack. Alkali – Aggregate Reaction. Corrosion- mechanism. **Factors affecting and Preventive measures** for all the above, including water – proofing techniques for various conditions, sacrificial anode, corrosion resistant steel, corrosion inhibitors, protective coatings etc.	**7**
Cracks in Concrete and Masonry Structures- Types, patterns, measurement and preventive measures	**3**
Assessment of Risk /Damage in Structures: *Preliminary investigation*- visual, history collection etc. *Detailed Investigation:* core cutting, rebar locator, corrosion meter, penetration resistance, pull out tests, half–cell potential, concrete resistivity etc. Interpretation of non destructive test data from all the above tests as well as rebound hammer number and ultra sonic pulse velocity. Destructive and chemical tests- on material samples from site.	**5**
Materials for Repair: polymers and resins, self curing compounds, FRP, ferro-cement- properties, selection criterion, cement based and polymer modified mortars etc	**4**
Repair Techniques: Grouting, Jacketing, External bonded plates- processes, limitations, design computations etc. including numerical problems. **Under Water Repair:** Processes	**6**
Case Studies: related to rehabilitation of bridge piers, heritage structures, masonry structures etc.	**2**
TOTAL	**28**

Suggested Readings:

1. *Properties of Concrete by A.M. Neville, Pearson.*
2. *Concrete Technology by M.S. Shetty, S.Cahnd & Comp.*
3. *Hand book of Analytical Techniques in Concrete Tech by V.S.. Ram Chandran, Standard Publishers.*

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VI SEMESTER

6CEU6.2: EARTHQUAKE RESISTANT CONSTRUCTION (L-2)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 2**

CONTENTS	Hrs.
Scope, objective and outcome of the course	**1**
Elements of Engineering Seismology: General features of tectonic of seismic regions. Causes of earthquakes, Seismic waves (Body and surface waves), earthquake size (magnitude, energy and intensity), Epicentre, Seismograph, Classification of earthquakes, Seismic zoning map of India, Static and Dynamic Loading, Fundamental period. Tsunami and liquefaction.	**8**
Common Causes and Modes of Failure of Buildings: Dynamic characteristics of buildings, natural period of vibration, damping, stiffness and isolation 1. RCC buildings: Soft storey effect, pounding, short column effect, poor reinforcement detailing, concept of weak beam and strong column, 2. Masonry Buildings: Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failure.	**8**
Architectural Aspect: Configuration, Plan of building, Size in horizontal plane and Size in vertical plane, Aspect ratio, Symmetry of the building, Re-entrant corners, Redundancy, etc. Irregularities in building in Horizontal plane and in Vertical plane. Torsional aspect. Type of Structures and Structure's forms/system.	**5**
Special Construction Practices: tips and precautions to be observed during design and construction of earthquake resistant building. Earthquake resistant features and use of IS 4326 for masonry buildings. Introduction to ductile detailing of RC buildings as per IS 13920	**6**
TOTAL	**28**

Suggested Readings:

1. *Earthquake Engineering by Pankaj Agarwal & Manish Shree Khande, Prentice Hall of India.*
2. *Earthquake Tips by C.V R. Murthy, IIT Kanpur.*
3. *Latest IS : 1893 (Part-I); Latest IS : 4326; Latest IS : 13920*

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VI SEMESTER

6CEU6.3: TRAFFIC ENGINEERING AND MANAGEMENT (L-2)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 2**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Traffic Planning And Characteristics: Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow .	**4**
Traffic Surveys: Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation –Level of service – Concept, applications and significance.	**5**
Traffic Design and Visual Aids: Intersection Design – channelization, Rotary intersection design – Signal design – Coordination of signals — Grade separation – Traffic signs including VMS and road markings – Significant roles of traffic control personnel – Networking pedestrian facilities & cycle tracks.	**6**
Traffic Safety and Environment: Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards –	**4**
Traffic Management: Area Traffic Management System – Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods- Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.	**8**
TOTAL	**28**

Suggested Readings:

VI SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

6CEU11: ENVIRONMENTAL ENGINEERING LAB-II (P-3)

Credit: 2 **Max. Marks: 75 (IA:50, ETE:25)**

1. To determine the pH of the given sample of sewage.
2. To determine Total Solids of the given sewage sample.
3. To determine the Total Dissolved Solids of the given sewage sample.
4. To find out Total Settle-able Solids of the given sewage sample.
5. To determine Total Suspended Solids of the given sewage sample.
6. To find out the Quantity of Dissolved Oxygen present in the given water sample by Winkler's Method.
7. To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
8. To find out Chemical Oxygen Demand of the waste water sample.
9. To study various Sanitary Fittings.

Design as per syllabus of theory.

VI SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

6CEU12: GEOTECHNICAL ENGINEERING LAB-II (P-3)

Credit: 2 **Max. Marks: 75 (IA:50, ETE:25)**

1. To determine the differential free swell index of soil.
2. To determine the grain size distribution of fine grained soil by Hydrometer.
3. To determine the CBR of soil.
4. To determine the compressibility parameters of soil by consolidation test.
5. To determine the swelling pressure of soil.
6. To determine the permeability of soil by constant and falling head methods.
7. To determine the shear strength parameters of soil by tri-axial test.
8. Design problems based different units of theory syllabus.

VI SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

6CEU13: CONCRETE STRUCTURES DESIGN-I (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

Analysis and Design Problems as per syllabus of theory.

VI SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

6CEU14: STEEL STRUCTURES DESIGN-I (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

Analysis and Design Problems as per syllabus of theory.

SYLLABUS

OF

VII SEMESTER

B.TECH. (CIVIL ENGINEERING)

(FOR 2018-19 ADMITTED BATCH)

Syllabus for B.Tech. (Civil): 2018-19 admitted batch

VII SEMESTER

7CEU01: DESIGN OF CONCRETE STRUCTURES-II (L-3, T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	1
Elements of Pre-stressed Concrete: Principles and systems, material properties, losses of pre-stress, I.S. specifications, analysis and design of rectangular and T sections for flexure and shear.	7
Torsion: Analysis and Design of beams for torsion as per codal method.. **Continuous and Curved Beams:** Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution. Analysis and design of beams curved in plan.	8
Circular Domes: Analysis and design of Circular domes with u.d.l. & concentrated load at crown. **Water Tanks and Towers:** Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.	8
Yield Line Theory: Introduction to Yield line concept, Application of Y.L.T. to slabs with simple support conditions. **Retaining walls:** Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis.	8
Culverts and Bridges: Analysis and Design of super structure of slab culverts and T-bridge for I.R.C. loading.	8
TOTAL	40

Suggested Readings:

1. *Reinforced Concrete Vol. II by H.J. Shah; Charotar Publication House.*
2. *Advanced Reinforced Concrete Design by Verghese; Tata Mc Graw Hill.*
3. *Advanced Reinforced Concrete Design by Krishnaraju; Tata Mc Graw Hill.*
4. *Bridge Engineering by Ponnuswamy; Tata Mc Graw Hill*
5. *Prestressed Concerte Structures by N. Krishna Raju; Tata Mc Graw Hill.*
6. *Bridge Engineering by Johnson Victor; Oxford and IBH Publishers.*
7. *Prestressed Concrete by T.Y.Lin and Burn; John Wiley & Sons.*
8. *Reinforced Concrete Structures by Park & Poulay; Willey.*
9. *Reinforced Concrete Designers Hand Book By Reynolds & Steedman*
10. *Manual of Concrete Practice ACI (www.concrete.org)*
11. Prestressed concrete structures by Praveen Nagrajan, Pearsons

VII SEMESTER

7CEU02: DESIGN OF STEEL STRUCTURES–II (L-3, T-1)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 4**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course Design of gantry girder. Design of roof trusses including wind loading and purlin design, Introduction to Pre Engineered Buildings and tubular sections and their applications.	**8**
Design of plate girder: Design of welded and bolted sections. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections. Web and flange splicing. Horizontal, Intermediate and Bearing stiffeners. Curtailment of plates. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800.	**8**
Bridges: Types of bridges, Loadings, Standard loading for railway bridges, Design of Deck type plate-girder bridges, design of its bracings and frames.	**8**
Design aspects of foot over bridges. Design of through type truss girder bridges including stringer design, cross girder design, main truss members, portal and sway bracings etc.	**8**
Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.	**8**
TOTAL	**40**

Suggested Readings:

1. *Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.*
2. *Design of Steel Structures by V.L Shah, Structures Publications.*
3. *Limit State Design of Steel Structures: S K Duggal- Tat Mc Graw Hill*
4. *Design of Steel Structures by N. Subrananian, Oxford University Press.*
5. *Design of Steel Structures by B.C. Punmia Laxmi Publication*
6. *Design of Steel Structures Vol. II by Ram Chandra, Standard Publishers.*

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VII SEMESTER

7CEU03: WATER RESOURCE ENGINEERING (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Introduction: Definitions, functions and advantages of irrigation, classification for agriculture, soil moisture and crop water relations, Irrigation water quality. Consumptive use of water, principal Indian crop seasons and water requirements, multiple cropping, hybrid crops, assessment of water requirements.	**7**
Canal Irrigation: Types of canals, parts of canal irrigation system, channel alignment, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels,	**5**
Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination, Estimation of run off. Well Irrigation: Open wells and tube wells, types of tube wells, duty of tube well water.	**11**
Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flownet, slope stability analysis, precautions of piping, principles of design of earth dams. Gravity Dams: Force acting on a gravity dam, stability requirements.	**8**
Diversion Head Works: Design for surface and subsurface flows, Bligh's and Khosla's methods. Different parts of diversion head works, types of weirs and barrages, design of weirs on permeable foundation. **Regulation of Works**: Falls, Classification of falls, Introduction to spillways	**8**
TOTAL	**40**

Suggested Readings:

1. *Theory and Design of Irrigation Structures by Varshney Gupta and Gupta, Nem Chand & Brothers, Roorkee.*
2. *Irrigation Water Power and Water Resource Engineering By KR Arora, Standard Publishers and Distributers, Delhi.*
3. *Water Resources Engineering by Modi ,Standard Publishers.*
4. *Fundamentals of Irrigation Engineering by Bharat Singh, Nem Chand Brothers, Roorkee.*

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VII SEMESTER

7CEU04: PROJECT PLANNING & CONSTRUCTION MANAGEMENT (L-3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Financial Evaluation of Projects and Project Planning: Capital investment proposals, criterions to judge the worth whileness of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure. Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives of construction project management.	**7**
Project Scheduling: Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.	**8**
Project Cost and Time Control: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.	**8**
Contract Management: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.	**8**
Safety and Other Aspects of Construction Management: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.	**8**
TOTAL	**40**

Suggested Readings:

1. *Project Management with CPM /PERT by B.C. Punmia, Laxmi Publication (P) Ltd.*
2. *Construction Project Management by K.K. Chitkara, Tata Mc Graw Hills.*
3. *Project Management by Modder & Phillph, CBS Publishers.*

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VII SEMESTER

7CEU5.1: FIRE AND SAFETY ENGINEERING

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

Contents	Hours
Objective, Scope and Outcome of the Course **Basic concepts of Fire Engineering:** Classification of fire, causes of fire, detection, prevention, extinguishing methods, first aid, fire-Fighting equipment.	4
Fixed fire-fighting Installations using Water: Hydrant or fire water system, Classification of hydrant system, Sprinkling system, Major foam pourer system, Steam drenching system, Emulsification	4
Fixed fire-fighting Installations without using water: Complete CO_2 flooding system, Complete DCP spraying system, Complete Halon flooding system	4
Fire Control Technology: Hose, Types of hose, Characteristics, Rope, Lines, knots and ladders, Pumps, primers, tenders and water relays	4
Hazardous Materials/Chemicals: their properties, transportation and storage, threshold limits of chemicals, limits of flammability, PPE's usage – respiratory and non-respiratory, handling and storage of high-pressure gas cylinders, work in confined places – risks and hazards,	6
Fire Resistant Construction: General requirement, fire resistance rating of different materials, factors affecting means of escape and structural fire safety, compartmentation, smoke extraction systems, fire separation wall	6
Fire Safety Design of Buildings: Aims, Principles, technical requirements, passive and active fire protection, Emergency and escape lighting, Fire detection and alarm systems, Signage, Fire-fighting shafts, Fire hydrants, Norms and standards as per National Building Code	8
Safety Management and Legislation: Functions of safety management, Factories Act 1948, Workmen compensation Act 1923	4
TOTAL	**40**

Suggested Readings:

1. *Fire Protection and Prevention by Brendra Mohan San, UBS Publishers & Distributors Pvt Ltd. Edition: 1st Edition 2008*
2. *Hand Book of Fire Technology by R.S. Gupta, Orient Longman Publishers, 2nd Edition 2005*
3. *Hand Book of Fire and Explosion Protection Engineering by Dennis P Nolan, Crest Publishing House, 1st Edition 2007*
4. *National Building Code, Bureau of Indian Standards.*

VII SEMESTER

7CEU5.2: RURAL WATER SUPPLY AND SANITATION (L- 3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course **General:** Importance of village community in India, Condition of Indian villages with special regard to economics, social and health aspects. **Sources of water:** Traditional sources of water in rural areas. Different types of wells, sanitary aspects in well construction, pumps used for village wells, Hand pump Technology, its operation and maintenance. Water harvesting techniques.	8
Quality of water: Estimation of total water requirement including cattle water demand, quality of water needed for village community, water quality surveillance, standards of water quality. **Communicable Diseases:** Diseases and immunity, Source of communicable diseases, Mode of transfer, Control of communicable diseases, Guinea worm Eradication.	8
Water Treatment: Slow sand filter, horizontal roughing filter and their combination. Disinfection of rural water sources, Fluoride and its removal. **Schemes of Rural water supply:** Different Schemes of Rural water supply in Rajasthan, Their Design and project formulation including the programmes and standards laid by Govt. of India and Govt. of Rajasthan.	8
Milk and Food sanitation: Essentials of dairy farm and cattle shed sanitation, Tests for milk and dairy products, food epidemics, food poisoning, Botulism. **Fly and Mosquito control:** Life cycle of flies and mosquitoes, various methods of flies and mosquito control.	8
Rural Sanitation: Village latrines, VIP latrines, pour flush latrines, materials, construction and cost of the latrines, Pollution aspects and pollution travel from latrines. Storm water and sludge problems. Septic tank, soak pit, small bore sewer system; its design and construction. Animal waste, method of composting, Biogas, collection and disposal of wastes. **Community Awareness and user participation:** Planning of communication support in rural supply and sanitation projects.	8
TOTAL	**40**

Suggested Readings:

1. *Rural Water Supply & Sanitation Manual by Govt. of India*
2. *Municipal and Rural Sanitation E.W.Steel, Mc Graw Hill Book Co.*
3. *Reports of Rajeev Gandhi National Drinking Water Mission*

VII SEMESTER

7CEU5.3: WIND AND SIESMIC ANALYSIS (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	1
Design Loads: Design loads for different types of buildings. (IS-875 part 1 & 2). Load distribution & concept of load flow to different structural components.	3
Structural Systems: Assumption of integrity aspect ratios & over turning resistance, strength & stiffness of buildings, symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations.	4
Wind loads: Wind loads & calculation of wind load on structures (IS: 875-Part 3).	8
Seismic loads: Earthquake loads & calculations of earthquake loads on buildings: masonry & framed structures. (IS: 1893 – Part 1).	8
Masonry and Framed Buildings: Design of masonry buildings and framed buildings, Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326, IS-13827, IS-13828, IS-13920, IS-13935.	8
Mass Housing: Prefabricated construction for mass housing. **Special Roofs:** Introduction to folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors..	8
TOTAL	40

Suggested Readings:

Latest IS : 875, Part I, II & III

Latest IS : 1893

Latest IS : 4326

Latest IS : 13920

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VII SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

7CEU11: DESIGN OF STEEL/ CONCRETE STRUCTURES (P-3)

(Alternate Design Class of 7CEU01 and 7CEU02)

Credit: 2 **Max. Marks: 75 (IA:50, ETE:25)**

Analysis & Design Problems as per syllabus of theory of 7CEU01 & 7CEU02.

VII SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

7CEU12: DESIGN OF WATER RESOURCE STRUCTURES (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

Analysis & Design Problems as per syllabus of theory.

VII SEMESTER

TYPICAL LIST OF EXPERIMENTS FOR LABS

7CEU13: PROFESSIONAL PRACTICES AND ESTIMATING (P-2)

Credit: 1 **Max. Marks: 75 (IA:50, ETE:25)**

1. **Estimates**: Methods of building estimates, types; site plan, index plan, layout plan, plinth area, floor area; Technical sanction, Administrative approval; estimate of buildings, roads, earthwork and R.C.C. works.
2. **Analysis of Rates:** For earthwork, concrete work, D.P.C., stone masonry,, plastering, pointing and roadwork.
3. **Specifications:** For different classes of building and Civil Engineering works.
4. **Types of contracts:** Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order.
5. **Arbitration**
6. **Valuation of Real Estate.**

SYLLABUS

OF

VIII SEMESTER

B.TECH. (CIVIL ENGINEERING)

(FOR 2018-19 ADMITTED BATCH)

VIII SEMESTER

8CEU1.1: NOISE & AIR-POLUTION AND CONTROL (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Introduction to Air Pollution: Air and its composition, Air Pollution, Sources of air pollution and its classification, Major air Pollutants and their characteristics, Specific group pollutants such as CFC, GHG etc. Air Pollutants from various industrial sectors. Impact of air pollution on human health and vegetation. **Introduction to Noise**: Difference between sound and noise, Pitch and Frequency, Sound Pressure, Sound Pressure level (Decibel), Leq, sources of noise and harmful effects of noise and noise measurement.	**7**
Pollutant Dispersion and Meteorology: Atmospheric meteorology, wind profiles, turbulent diffusion, topographic effects, separated flows, temperature profiles in atmosphere, stability, inversions, plume behaviour. Concept of atmospheric stability. Adiabatic and Environmental Lapse rate. Plume behavior. Concept of maximum mixing depth and ventilation coefficient. Plume rise and effective stack height.	**8**
Air Quality: Introduction to Air quality index and Comprehensive Environmental Pollution Index etc. and its application. Sampling and measurement of air pollutants. Introduction to National Ambient Air Quality Standards. **Air Quality Monitoring:** Objectives, time and space variability in air quality; air sampling design, analysis and interpretation of air pollution data, guidelines of network design in urban and rural areas. Stack monitoring.	**10**
Impacts of Air Pollution: Extreme air Pollution scenarios: Acid Rain, Global Warming, Smog, Ozone layer depletion etc. Various treaties and protocols: Kyoto Protocol and Montreal Protocol etc. **Control methods and equipment**: Introduction to control methods and equipment for Particulate matter and gases. Design and working of scrubbers, Electrostatic Precipitator, Gravity settlers, Cyclone separator, Filter bags etc. Other mechanisms of air pollution control such as Biochemical Processes, catalytic processes etc.	**10**
Noise standards and limit values: Noise instrumentation and monitoring procedure. Noise indices, Methods of abatement of noise pollution. Guidelines and laws Governing air and noise pollution.	**4**
Total	**40**

Suggested Readings:

1. *L Theodore, Air Pollution Control Equipment Calculations, John Wiley and Sons, 2008.*
2. *De Nevers, N., Air Pollution Control Engineering, 3rd edition Waveland Press Inc 2016.*
3. *Sagar Pal Singal, Noise Pollution and Control Strategy, Alpha Science International Ltd; 2005 2nd Edition.*
4. *Howard S. Peavy, Donald R. Rowe, George Tchobanoglous, Environmental Engineering, McGraw-Hill, 1985.*
5. *A Tiwari and J Colls, Air Pollution: Measurement, Modeling and Mitigation, Taylor & Francis, 2010.*
6. *Richard W. Boubel et al "Fundamentals of Air pollution", Academic Press, New York, 1994.*

VIII SEMESTER

8CEU1.2: SOCIAL ASPECTS IN CIVIL ENGINEERING (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Introduction: What are Social Aspects of Engineering; Development Processes: Inter relationship between social, economic, scientific and technological factors for development. Development criteria; gross national product, energy consumption. Thermal comfort aspects of housing	**7**
Technology Assessment and Transfer: Criteria for assessment and selection of technology, appropriate technology concept, technology transfer and development. Project Planning, Appraisal and Feasibility: Techno economic feasibility studies, Project planning and control, life cycle costing. Software applications in life cycle cost analysis. Development of Science and Technology: Information technology application in Project Designing, Project evaluation programme, implementation and monitoring.	**8**
Rural economy, poverty, unemployment, exodus to urban areas.Technology for rural and Desert Areas, Characteristic of desert areas, Thar desert ,desertification and its control, sand dunes stabilisation. Rural energy needs, Modern Solar appliances, Challenges in Solar Power and Wind Power Generation and their Connection to Grid. Rural industries, Transport in rural and desert areas, Drought, Famine and Disaster management.	**8**
PMGSY Project. Right to Information act-its provisions. Land acquisition act Financing methods of infrastructure projects-BOT, PPP etc., Case studies of recent projects in Rajasthan-Refinery, IIIT, NHAI Highway, Dedicated Freight Corridor, Metro Rail Project; Human Relations in Industry and Industrial Laws: Application of social sciences to industry; Labour relations, Trade unions,. MNREGA project.	**8**
Environmental degradation due to energy production, transport, industries, mining and intensive agricultural practices, control of air and water pollution. Hazards of environmental pollution. Health problems, challenges and their remedies. Depletion of natural resources due to population explosion and continuously rising standards of living. Environment impact analysis of projects, green technologies, Concept of sustainable development. National environmental laws. Carbon footprint of technologies, carbon credit system. Dumping of Radioactive waste-methods and monitoring. Effect on health.	**8**
TOTAL	**40**

Suggested Readings:

VIII SEMESTER

8CEU1.3: GROUND IMPROVEMENT TECHNIQUES (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Introduction to scope, objective and outcome of subject.	**1**
Introduction: Formation of soil, major soil types, collapsible soil, expansive soil, reclaimed soil, sanitary land fill, ground improvements; objective, potential.	**4**
General Principles of Compaction: Mechanics, field procedure, quality control in field.	**3**
Ground Improvement in Granular Soil: In-place densification by (a) Vibro-floatation (b) Compaction piles in sand(c) Vibro compaction piles (d)Dynamic compaction (e) Blasting	**8**
Ground Improvement in Cohesive Soil: Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate of consolidation, Preloading methods. Types of drains, Design of vertical drains, Construction techniques.	**5**
Stone Column: Function, Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.	**3**
Ground Improvement by Grouting & Soil Reinforcement: Grouting in soil: Types of grout, desirable characteristics, Grouting pressure, Grouting methods.	**4**
Soil Reinforcement: Mechanism, Types of reinforcing elements, Reinforcement- Soil interaction, Reinforced soil application beneath roads, foundation and retaining walls.	**4**
Soil Stabilization: Lime Stabilization – Base Exchange Mechanism, Pozzolonic Reaction, Lime-soil Interaction, Lime Columns, Design of Foundation on Lime Column; **Cement Stabilization**-Mechanism, amount, Age and curing; **Fly Ash-Lime Stabilization; Soil Bitumen Stabilization**	**8**
TOTAL	**40**

Suggested Readings:

1. *Ground Improvement Techniques by Purushottam Raj, Tata Mc Graw Hills, Delhi.*
2. *Text book of Geostatic Engineering by Gulhati & Dutta, Tata Mc Graw Hills, Delhi.*
3. *Principles of Foundation Engg by B.M. Das, Thomson, Books/Cole.*
4. *Foundation Design Manual By N.V Nayak, Dhanpat Rai and Sons.*
5. *Soil Engineering in Theory and Practice Vol. III by Alam Singh CBS Publishers*

VIII SEMESTER

8CEU2.1: GEOGRAPHIC INFORMATION SYSTEM AND REMOTE SENSING (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Photogrammetry: Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs, Aerial camera and photo-theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopic vision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps and Map substitutes and their uses.	**8**
Remote Sensing: Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.	**8**
Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multi concept in Remote Sensing.	**8**
Image Interpretation: Principles of interpretation of aerial and satellite images, equipments and aids required for interpretation, ground truth – collection and verification, advantages of multidate and multiband images. Digital Image Processing concept.	**8**
Geographic Information System (GIS) : Introduction & applications of GIS in map revision, Land use, Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitability analysis, change detection.	**8**
TOTAL	**40**

Suggested Readings:

1. *Basics of Remote Sensing & GIS by Dr. S.Kumar , Univertsity Sc. Press.*
2. *Geographic Information System by Kang Tsung Chang, Tata Mc Graw Hills.*
3. *Remote Sensing and GIS by Legg.C.A., Ellis Horwood, London.*
4. *Remote sensing and GIS by Bhatt Oxford University Press*

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VIII SEMESTER

8CEU2.2: TOWN PLANNING (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Introduction: Objects of town planning, Fundamentals and principles of town planning, Origin and growth of towns – development of towns, Modern town planning in India, Socio – Economic aspects of town planning. Selection of site for an ideal town.	**4**
Surveys & Planning: Various types of surveys to be conducted for town planning project. Data's to be collected in different types of town planning survey. Introduction to Cadastral (Khasra Maps) and Land records. **Demography and Demographic Projections.** Introduction to Statistical and Quantitative Methods of Planning. **Introduction to GIS and its importance in planning practice.**	**5**
Components of Urban Planning **Residential:** Housing requirements and Shortage in Urban and Rural sector. **Formation and role of various Housing development bodies / agencies.** **Slums**: Causes, growth, characteristics, effects, slum clearance and re-housing, prevention of slum formation, financial assistance for slum clearance. **Public Buildings & Industries:** Classification of public building, Effects of Industrial development on Urban, Rural and Regional context, **Utilities and Facilities.** Various types of Public Utilities & community Facilities and their inclusion in Planning. Solid waste Management. **Recreation measures:** Requirements of Parks, Playgrounds, Theme parks, Water Bodies etc. **Introduction to Landscape design.** **Transportation:** Classification of roads, Various Transportation facilities e.g. Truck terminals, Bus Terminus and Bus stands, Railway Station. Airports. Ports and Harbor	**12**
Master Plan: Meaning – Definition – objects and necessity of master plan, Data and Drawings required for master planning. Land Use Planning and it's denotion. A brief note on **Fundamentals of** Urban, Rural and Regional planning. **Approach for Sustainable Development. Environmental Impact assessment.** Zoning: Definition – objects and principles of zoning. Advantages of zoning, Special Economic Zone (SEZ), Maps for zoning. Zoning Regulations and Building bye laws. **Introduction to Planning Legislation and various Town Planning Acts.**	**8**
Traffic & Transportation Planning: objects, requirements, classification, types of street systems, through & bypass roads, outer & inner ring roads, expressways, freeways, waterways etc.	**6**
Neighbor-hood Planning: General, features, Analyzing the defects of existing towns, difficulties in Planning of existing towns / cities - Urban renewal projects, Conurbations, merging of suburban areas – Decentralization - Satellite Towns. **Features of Infrastructure Planning in Smart cities:** Road Section showing with sewer lines, water supply, storm water drain, gas line, electricity line, telephone line, green belt etc. (treated water from sever line / drain / Nallaha to be used for irrigation). Beautification of Nallahas. Garbage Collection Points, Trashing Yards & Final Disposal of Garbage. Water Bodies. Rain Water Harvesting Schemes for Entire Town.	**4**
TOTAL	**40**

Suggested Readings:

1. *Town Planning by Rangwala.*
2. *Fundamentals of Town Planning by G.K Hiraskar.*
3. *Town Planning by AbirBandyopadhyay.*
4. *Urban and Regional Planning education by Kumar, Ashok, Meshram*

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VIII SEMESTER

8CEU2.3: PRESTRESSED CONCRETE (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

S. N.	Course Content	Hrs.
1	**Objective, Scope and Outcome of the Course**	**1**
2.	**Introduction:** Basic concepts of Pre-stressing and its advantages. Materials for pre-stressed concrete. Categories of Tensioning devices. Pre-tensioning & Post-tensioning: Principle. Method and systems of pre and post tensioning.	**4**
3.	**Analysis of Pre-stress and Bending Stresses**: Assumptions, Flexural analysis of pre-stressed rectangular and unsymmetrical T section for eccentric straight tendon, bent tendon and tendon with parabolic profile. Concept of load balancing.	**6**
4.	**Losses of Pre-stress**: Losses due to - elastic deformation of concrete, successive tensioning of curved cable, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip.	**4**
5.	**Design of Pre-stressed Concrete Sections:** preliminary and final design of sections, design of pre and post tensioned flexural members; simply supported and continuous members.	**7**
6.	**Flexural, Shear and Torsion Resistance of Members:** simplified code procedure (IS-1343-2012);	**4**
7.	**Pre-stressing techniques:** transfer of pre-stress, code provisions for bond and transmission length.	**4**
8.	**Cable profiles:** Concordant and non-concordant cable profile and associated factors in continuous members. Modern cable laying: materials & practices, precautions etc.	**4**
9.	**Deflection:** Factors affecting deflection; Effect of tendon profile on deflection; Computation of deflection in pre-stressed concrete members.	**6**
	TOTAL	**40**

Suggested Readings:

1. *Design of Pre stressed Concrete by N.Krishnan Raju, Tata Mc Graw Hills.*
2. *Design of Pre stressed Concrete by T.Y. Lin, Wiley Eastern International.*
3. *Design of Pre stressed Concrete Structures by N.Sinha Ray, S.Chand Co.*
4. *Prestressed concrete structures by Praveen Nagrajan, Pearsons*

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VIII SEMESTER

8CEU3.1: FOUNDATION ENGINEERING (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	1
Shallow Foundation: Methods of estimation of bearing capacity, computation of bearing capacity factors, Effect of eccentric and inclined loads, effect of water table on bearing capacity, Terzaghi, Vesic, Hansen, Moyerhof's analysis, Bearing capacity of stratified soils. IS code recommendations for minimum depth, factor of safety, design for local shear and general shear failure.	8
Settlement Under Foundation: Methods of estimation of settlement of footings. Limits of settlements for various structures, Indian Standard Code Provisions (IS: 1904, 6403, 8009). Determination of allowable bearing capacity as per IS code. Schemartman's method, Dee beer's and Mortin method of finding out settlement from static cone penetration test. Methods of finding out bearing capacity from plate load test, standard penetration test data.	8
Pile Foundation: types of pile and their use, modes of failure. Bearing capacity and settlement of pile foundation. Types of piles, Allowable load, Pile load test, Dynamic and static formulae. Bearing Capacity factors. Pile group bearing capacity and settlement. Negative skin friction. Behavior of piles under lateral loading. Winkler's assumption. Pile resistance and deflection under lateral loads, elastic method, Brooms method.	8
Foundation on Difficult Soils: Collapsible soil; identification, Collapse settlement: foundation design. Sanitary land fills settlement of sanitary land fill. **Expensive soils**: Behaviour of expansive soil, foundation practices, under-reamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil. Provision of IS 2911 Part III-1980 for design of under-reamed pile foundations.	8
Raft foundation: Common types of raft, combined footing. Bearing capacity of raft, differential settlement of raft; semi empirical method of design of raft foundation. **Well foundations**: design and construction. Bearing capacity, settlement and lateral resistance. Tilts and shifts, IS and IRC codes methods.	8
TOTAL	40

Suggested Readings:

1. *Basic & Applied Soil Mechanics -by Ranjan & Rao, New Age International Publishers.*
2. *Geotechnical Engineering by Gulhati & Dutta , Tata Mc Graw Hills, Delhi.*
3. *Design Aids in foundation Engineering by Kaniraj, Tata Mc Graw Hills, Delhi.*

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VIII SEMESTER

8CEU3.2: PAVEMENT DESIGN (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

Syllabus	Hrs.
Objective, Scope and Outcome of the Course	**1**
History of Pavements, Pavements types, Advantages and Dis advantages Components of pavement structure, importance of sub-grade soil properties on pavement performance. Functions of sub-grade, sub-base, base course and wearing course.	**4**
Pavement Mix Analysis: Aggregate blending, bituminous mix design – Marshall Stability approach, concrete mix design for roads.	**4**
Stresses in Flexible Pavements: Stresses in homogeneous masses and layered systems, deflections, shear failures, equivalent wheel and axle loads	**4**
Elements in Design of Flexible Pavements: Loading characteristics-static, impact and repeated loads, effects of dual wheels and tandem axles, area of contact and tyre pressure, modulus or CBR value of different layers, equivalent single wheel load, equivalent stress and equivalent deflection criterion, equivalent wheel load factors, climatic and environmental factors.	**5**
Design Methods for Flexible Pavements: California bearing ratio (CBR), U.S. Navy method. Triaxial method, Mcleod method, Boussinesq's and Burmister's analysis and design method, IRC method for Flexible Pavement Design	**6**
Rigid Pavements: Wheel load stresses, Westergaard's analysis, Bradbury's approach Arlington test, Pickett's corner load theory and charts for liquid, elastic and soil of finite and infinite depths of subgrade. IRC Method of rigid pavement design	**6**
Temperature Stresses: Westergaard's and Thomlinson's analysis of warping stresses, Combination of stresses due to different causes, Effect of temperature variation on Rigid Pavements.	**4**
Reinforced Concrete Slabs: Prestressed concrete slabs-general details. Design of Tie Bars and Dowel Bars	**4**
Defects in pavements: Common reasons of failures in flexible and rigid pavements and remedial measures	**2**
TOTAL	**40**

Suggested Readings:

1 *Y oder, E.J. and Witczak, M.W., "Principles of Pavement Design 2nd Ed", John Wiley & Songs,* Inc.

2 *O'Flaherty, A. Coleman, "Highways : the Location, Design, Construction and Maintenance of Road Pavements", 4th Ed., Elsevier*

3 *O'Flaherty, A. Coleman, "Highways : the Location, Design, Construction and Maintenance of Road Pavements", 4th Ed., Elsevier*

4 *Fwa, T.F., "The Hand Book of Highway Engineering", CRC Press Taylor & Francies Group Khanna, S.K. and Justo, C.E.G., "Highway Engineering Nem Chand Jain & Bros*

5 *Papagiannakis, A.T. and Masad, E.A., "Pavement Design and Materials, John Wiley & Sons Inc.*

6 *Related IS codes and IRC publications*

VIII SEMESTER

8CEU3.3: BRIDGE ENGINEERING (L -3)

Exam Hours: 3 **Max. Marks: 150 (IA: 50, ETE: 100)** **Credit: 3**

CONTENTS	Hrs.
Objective, Scope and Outcome of the Course	**1**
Introduction: Type of bridges & classification of road & railways bridges. IRC & Railway loadings for bridges, wind load & Earthquake forces. Steel bridges Design of through type & deck type steel bridges for IRC loading. Design of deck type & through type truss bridges for railway loadings.	**8**
Reinforced Concrete Culverts & Bridges: Reinforced concrete slab culvert, T-beam bridges-courbons & Hendry-Jaegar methods. Design of balanced cantilever bridge.	**8**
Prestressed Concrete Bridges: Prestressed & Post stressed concrete bridges Design of deck slab & girder sections.	**8**
Bearings: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II).	**8**
Joints: Expansion joints.	**8**
TOTAL	**40**

Suggested Readings:

1. *Design of Bridge Structures by T.R. Jagadeesh & M.A. Jayaram, Prentice Hall Of India (PHI).*
2. *Bridge Engineering by Victor, Oxford and IBH Publishers.*
3. *Design of Bridges by Krishna Raju, Oxford and IBH Publishers.*
4. *Bridge Super Structures by Raj Gopalan, Standard Publishers & Distributers.*
5. *Goncrete Bridge Practice by Raina V.K., Tata Mc Graw Hill Co.*
6. *Bridge Engineering by Ponnuswamy, Tata Mc Graw Hills*

Anil K. Mathur