

**SYLLABUS**

**BACHELOR OF ENGINEERING  
CIVIL ENGINEERING**

**(Semester Scheme)**

**FOUR YEAR INTEGRATED COURSE**

**B.E. Second Examination, 2014-15**

**B.E. Third Examination, 2015-16**

**B.E. Fourth Examination, 2016-17**



**JAI NARAIN VYAS UNIVERSITY  
JODHPUR**

## **IMPORTANT**

With a view to bring about greater reliability, validity and objectivity in the examination system and also for closer integration of teaching, learning and evaluation.

(i). The syllabus has been divided into units. Questions will be set from each unit with provision for internal choice.

(ii). In order to ensure that the students do not leave out the important portion of the syllabus, examiners shall be free to repeat the questions set in the previous examinations.

(Ref. Resolution No. 21 (C) of Academic Council dated 9-2-84)

The examinees be permitted to use their personal transistorised pocket battery operated calculators in the examinations. The calculators to be used by the candidates in the examinations should not have more than 12 digits, 6 functions and 2 memories and should be noiseless and cordless. A calculator belonging to one candidate shall not be allowed to be used by another candidate. The Superintendent of the Centre will have complete discretion to disallow the use of a calculator which does not conform to the above specification.

(Ref. Res. No. 6/90 of Academic Council dated 20<sup>th</sup> July, 1990)

In Engineering and any other examinations where the use of calculators is already permitted, it shall remain undisturbed.

## **Notification**

**In compliance of decision of the Hon'ble High Court all students are required to fulfil 75% attendance rule in each subject and there must be 75% attendance of the student before he/she could be permitted to appear in the examination.**

**REGISTRAR  
(Academic)**

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**BACHELOR OF ENGINEERING  
(SEMESTER SCHEME)**

**FOUR YEAR INTEGRATED COURSE**

**ACADEMIC REGULATIONS**

1. ***Admission:***

A candidate for admission to the four year degree programme for B.E (Building & Construction Technology, Civil, Chemical, Computer Science & Engineering, Electrical Engineering, Electronics & Communication, Electronics & Electrical Engineering Electronics & Computer Engineering, Information Technology, Mechanical, Mining, Production and Industrial Engineering) must have passed (10+2) Senior Secondary (with English, Physics, Chemistry & Mathematics) of a board situated in the State of Rajasthan or other examinations recognized as equivalent or higher thereto and selected through RPET or otherwise as per the procedure laid down by the University from time to time.

2. The course of study shall extend over a period of four years (eight semesters as an integrated course). A student shall follow the prescribed courses as given in the teaching and examination scheme of the courses to which he is admitted.

3. There shall be a theory examination (Main Examination) at the end of each Semester in B.E (Building & Construction Technology, Civil, Chemical, Computer Science & Engineering, Electrical Engineering, Electronics & Communication, Electronics & Electrical Engineering Electronics & Computer Engineering, Information Technology, Mechanical, Mining, Production and Industrial Engineering), viz.,

At the end of First Semester

First B.E., First Semester Examination

At the end of Second Semester

First B.E., Second Semester Examination

At the end of Third Semester

Second B.E., Third Semester Examination

At the end of Fourth Semester

Second B.E., Fourth Semester Examination

At the end of Fifth Semester

Third B.E., fifth Semester Examination

At the end of Sixth Semester

Third B.E., Sixth Semester Examination

At the end of Seventh Semester

Final B.E., Seven Semester Examination

At the end of Eighth Semester

Final B.E., Eight Semester Examination

(a) Practical and sessional examinations of I and II semester of First B.E. will be held at the end of II semester of the year.

- (b) Practical and sessional examinations of odd and even semester First B.E., Second B.E. Third B.E. & Fourth B.E. will be held at the end of each semester of the year.
  - (c) A candidate will be given mark sheet at the end of semester examination of I, II, III & IV year of the respective semester/year to indicate performance of the candidate as per the scheme of teaching and examination after the declaration of result.
4. The attendance requirement in the Faculty of Engineering & Architecture shall be same as per ordinance as follows:

O. 78-A:

(1) For all regular Candidates in the Faculties of Arts, Education and Social Sciences, Science, Law, Commerce and Engineering the minimum attendance requirement shall be that a candidate should have attended at least 70% of the lectures delivered and the tutorials held taken together as well as 70% for the practical and sessionals from the date of her/his admission.

(2) **Condition of shortage of attendance:**

The shortage of attendance up to the limits specified below may be condoned on valid reasons:

(i) Upto 6% in each subject plus 5 attendances in all aggregate of subject/papers may be condoned by the Vice-Chancellor on the recommendation of the Dean/Director/Principal for undergraduate students and on the recommendation of the Head of the Department for the Post-graduate classes.

(ii) The N.C.C./N.S.S. cadets sent out to parades and camps and such students who are deputed by the University to take part in games, athletics or cultural activities may for - Purposes of attendance be treated as present for the days of these absence in connection with the aforesaid activities and that period shall be added to their subject wise attendance.

5. (a) A candidate who has attended a regular course of study in the Faculty of Engineering and Architecture for the first semester of first B.E. shall be eligible for appearing at the first semester examination of first B.E. for the B.E. degree which shall be common to all branches.

(b) Every candidate appearing for the first semester of first B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

(c) A candidate who has attended a regular course of study for the second semester of first B.E. and has appeared in the first semester examination shall be eligible for appearing at the second semester examination of first B.E. for the B.E. degree, which shall be common to all branches.

(d) Every candidate appearing for the second semester of first B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

6. (a) The course of study for the second B.E. Examination shall be separate for all branches of study.

A candidate who after passing I & II semester of First B.E. examination and has attended regular course of study in a particular branch of Engineering for the Third semester Second B.E. shall be eligible for appearing at the Third semester examination of second B.E. in that branch of study.

(b) Every candidate appearing for the third semester of second B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

(c) A candidate who has attended a regular course of study for the Fourth semester of second B.E. and has also appeared in the third semester examination of second B.E. shall be eligible for appearing at the fourth semester examination of second B.E. in that branch of study.

(d) Every candidate appearing for the fourth semester of second B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

7. (a) A candidate who after passing III & IV Semester of second B.E. examination and has attended a regular courses of study in a particular branch of Engineering for the fifth semester of Third B.E. shall be eligible for appearing at the fifth semester examination of third B.E. in that branch of study.

(b) Every candidate appearing for the fifth semester of third B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

(c) A candidate who has attended a regular course of study for the sixth semester of third B.E. and also has appeared in the fifth semester examination of third B.E. shall be eligible for appearing at the sixth semester examination of third B.E. in that branch of study.

(d) Every candidate appearing for the sixth semester of third B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

8. (a) A candidate who after passing V and VI semester of third B.E. examination and has attended a regular courses of study in a particular branch of Engineering for the seventh semester of final B.E. shall be eligible for appearing at the eight semester examination of final B.E. in that branch of study.

(b) Every candidate appearing for the seventh semester of final B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

(c) A candidate who has attended a regular courses of study for the eight semester of final B.E. and has also appeared in the seventh semester examination shall be eligible for appearing at the eight semester examination of final B.E. in that branch of study.

(d) Every candidate appearing for the eight semester of final B.E. examination shall be required to show a competent knowledge of the subjects as per examination and teaching scheme.

9. Every candidate is required to undergo practical training in a workshop, factory, mine or engineering works/design office approved by the Dean of the Faculty for a period as mentioned below:

- |                                                                |                 |
|----------------------------------------------------------------|-----------------|
| (a) Building & Construction Technology after II and III        | 40+60=100 days  |
| (b) Civil Engineering after II and III Year                    | 40+60=100 days  |
| (c) Chemical Engineering- after II and III Year                | 40+60= 100 days |
| (d) Computer Science & Engineering -after II and III Year      | 40+60= 100 days |
| (e) Electrical Engineering- after II and III Year              | 40+60=100 days  |
| (f) Electronics & Comm. Engineering- after II and III Year     | 40+60=100 days  |
| (g) Electronics & Electrical Engineering after II and III Year | 40+60=100 days  |
| (h) Electronics & Computer Engineering after II and III Year   | 40+60=100 days  |
| (i) Information Technology- after II and III Year              | 40+60=100 days  |
| (j) Mechanical Engineering- after II and III Year              | 40+60=100 days  |
| (k) Mining Engineering- after II and III Year                  | 40+60=100 days  |
| (l) Production & Industrial Engineering- after II and III Year | 40+60=100 days  |

10. (i) The candidate has to pass individually in all subjects of each semester from I to VIII semesters. The result of I, III, V and VII semester shall be declared without awarding the division. The division will be awarded on the basis of combined performance of I & II semesters, III & IV semesters, V & VI semesters and VII & VIII semesters respectively.

(ii) For a candidate to pass in each semester he/she must obtain -

- 35 percent marks in each written paper.
- 50 percent marks in each of the practicals & sessionals.
- 45 percent in the grand total of the semester.

(iii) For I and II semester examinations, if a candidate fails in not more than 3 units (excluding Humanities and Social Science) in a semester examination, and for III to VII semester examinations, if a candidate fails in not more than 3 units in a semester examination, he/she shall be allowed to keep term (ATKT) in the next higher semester, subject to the provisions of clause 5(C), 6(C), 7(C), and 8(C). He/She shall appear in those units(s) along with regular candidates whenever examination of that semester is held and pass in the units(s) in which he/she has failed. For the purpose of this clause, each written paper and each practical and sessional shall be counted as a separate unit. For I B.E. examination, candidates failing in English & Social Science shall be awarded an additional ATKT.

(iv) For first B.E. examination if a candidate fails in not more than 3 units he/she shall be allowed to keep term (ATKT) in the next higher i.e. third semester. For the purpose of this clause each theory paper (part I and II taken together) and each practicals & sessionals shall be counted as one unit. He/She shall be required to appear in the ATKT exams in that unit(s) along with third semester examinations. Candidate failing in English/Social Sciences shall be awarded an additional ATKT.

(v) For III to VII semester examination, if a candidate fails in not more than three units in a semester examination he/she shall be allowed to keep term (ATKT) in the next higher semester, subject to the provision of clause 6(c), 7(c) and 8(c). He/she shall appear in those unit(s) alongwith regular candidates regular when ever examination of that semester is held and pass in the unit(s) in which he/she has failed for the purpose of this clause and each written paper and each practical and sessional of a semester shall be counted as a separate unit.

**NOTE :** A candidate who is unable to appear at the semester examination in some papers, practicals & sessionals due to any reason what so ever, shall be considered as having failed in those paper(s), Practical(s) & Sessional(s).

11. No candidate shall be permitted to pursue a regular course of study of Fourth BE (VII and VIII semesters) unless he/she has passed all the units of First B.E. examination. However, the unit of English/Social Science of First B.E. is exempted for this purpose.

## **12. Ex- Student**

(i).For I and II semester examinations, if a candidate fails in more than 3 units (excluding English & Social Science) in a semester examination, and for III to VII semester examinations, if a candidate fails in more than 3 units in a semester examination, he/she shall be declared failed. Such candidate shall appear in that semester examination as Ex-student in all papers.

(ii) A candidate who has passed all practicals and sessionals and failed in more than 3 units of written papers in a semester shall appear in the semester examination as Ex-student in all written papers. His/her practical and sessional marks of the semester shall be carried over.



13. A candidate, promoted to II BE, may be permitted to change his/her branch of study, from GAS Course to GAS Course and from SFS Course to SFS Course only, strictly on the basis of merit secured in B.E. I year examination (first and second semester examination taken together) depending upon the vacancies available in a particular branch of study which shall be determined as follows.

"The maximum strength of a branch should not increase by more than 10 percent of sanctioned strength and the minimum strength of a branch should not be decreased to less than 90 percent of the sanctioned strength".

The sanctioned strength of a branch shall be reckoned to the number of candidates who have been promoted to the second year (Third Semester).

14. ***Award of Division:***

(a) First B.E. to Third B.E.

First Class : if a candidate secures a minimum of 60 percent  
Second Class : if a candidate secures a minimum of 50 percent  
Pass Class : if a candidate secures a minimum of 45 percent

(b) Final B.E.: for the declaration of Final B.E. result, marks shall be totaled up as follows:

First	B.E.	50% of the Marks secured
Second	B.E.	75% of the Marks secured
Third	B.E.	100% of the Marks secured
Final	B.E.	100% of the Marks secured

(c) For determining merit position of the candidates at the final year level the marks obtained by them in the second, third and final year as described above shall only be considered.

(d) A candidate shall be awarded a degree with Honours if she/he secures a minimum of 70 per cent of aggregate marks. A candidate shall be awarded a degree with first class if she/he secures a minimum of 60 per cent of aggregate marks. A candidate shall be awarded a degree with second class if she/he secures a minimum of 50 per cent of aggregate marks. The rest of the successful candidates will be awarded pass class.

**15. Requirement of additional degree:**

(a) An engineering graduate of the Jai Narain Vyas University, Jodhpur who wishes to qualify for an additional degree of Engineering of the University will be considered by a committee consisting of the Dean and the Head of the Department concerned.

(b) He/She will be admitted in Second B.E. class of that branch. The papers and practicals and sessionals which he/she has to appear at the various examination in that branch will be decided by the above committee.

(c) He/She will be awarded division as follows:

(i) 75 per cent of marks of the papers and practical and Sessionals and Project if any, in which he/she appears for Second B.E.

(ii) 100 per cent of marks of the papers and Practical and Sessionals and Project if any, in which he/she appears for Third B.E.

(iii) and 100 per cent of the papers and Praticals and Sessionals and Project if any, in which he/she appears for Final Year.

(d) His/her marks for the training which he/she has undergone after Second and Third B.E.

He/She will be awarded division in Final year as per regulation.

He/She will not be awarded any position in the class.

(e) Mention will be made in the certificate that he/she has qualified for the additional degree.

16. The medium of Instructions and Examination in all Engineering Examinations of Theory/Practical and Sessionals, shall continue to be English as hitherto.

**17. Make up Examination for VIII Semester:**

(a) There shall be a Make up Examination for the VIII Semester only for those candidates who are eligible for ATKT in VIII semester, at a suitable interval of time after declaration of the result of the VIII Semester Examination. Candidates, who fail or are unable to appear at this Examination, shall appear in the immediate corresponding ensuing Semester Examination.

(b) Candidates who have failed in the Final B.E. Examination but have passed in project, practical training and tour, and obtained 45 percent in the grand total, shall be exempted from re-examination in project, practical training and tour and shall be required to pass the examination in the rest of the subjects only.

(c) A candidate who passes in a limited number of Theory papers/Practical and Sessionals/Project in VIII Semester Examination shall be awarded division with a mention of “Pass in more than one attempt” on the mark sheet with asterisks on the respective Theory papers / Practical and Sessionals / Project.

**18. For diploma passed candidates admitted to B.E.:**

(a) The diploma passed candidates admitted in the Second B.E. (all branches) shall be required to undergo a regular course of study in Special Mathematics III and IV semesters of II B.E. alongwith other theory units of the semester examinations. For a candidate to pass in Special Mathematics examination the combined marks obtained in III & IV Semester shall be counted. Candidate failing in special mathematics shall be awarded one additional ATKT.

(b) No candidate of this category shall be permitted for regular course of study in Final B.E. unless he/she has passed the special Mathematics paper.

**19. For B.Sc Passed Candidates admitted to B.E.**

(a) The students admitted under THIS category will have to clear deficiencies of Engineering subjects (theory and Practical) of B.E Ist year as mentioned below:-

**Theory:**

- (i) Elements of Mechanical Engineering
- (ii) Civil Engineering
- (iii) Basic Electrical Engineering
- (iv) Basic Electronics
- (v) Engineering Mechanics

**Practical**

- (i). Engineering Graphics
- (ii) Workshop Practice I & II
- (iii) Engineering Mechanics Lab.
- (iv) Civil Engineering Lab.
- (v) Mechanical Lab.
- (vi) Basic Electronics Lab.
- (vii) Machine Drawing
- (viii) Basic Electrical Lab.

(b).No candidate of this category shall be permitted for regular course of study in Final B.E. unless he/she has passed the special Mathematics paper in 19 (a).

## **LIST OF MEMBERS OF TEACHING STAFF**

### **CIVIL ENGINEERING DEPARTMENT**

#### **Professor & Head**

1. Dr. D.G.M. Purohit      B.E., M.E., Ph.D., MISDT

#### **Professors**

1. Dr. Arvind Rai      B.E. (Hons.), M.E., Ph.D, MISDT

2. Dr. S.K. Ojha      B.E. (Hons), M.E. (Hons), Ph.D

3. Dr. N.K. Ameta      B.E., M.E., Ph.D

4. Dr. Sunil Sharma      B.E., M.E., Ph.D.

#### **Associate Professors**

1. Dr. S.K. Singh      B.E., M.E. (Hons), Ph.D

2. Dr. Ravi Saxena      B.E., M.E., Ph.D

3. Dr. A.N. Modi      B.E., M.E., Ph.D

#### **Assistant Professor**

1. Shri Kamal Bhandari      B.E., M.E.

## STRUCTURAL ENGINEERING DEPARTMENT

### Professor & Head

1. Dr. Ajay Kumar Gupta M.E., Ph.D

### Associate Professor

1. Shri R.K. Singhal B.E. , M.E.

2. Shri Vasu Dev Chhangani B.E.

3. Dr. Sher Singh Gehlot B.E., M.E.,Ph.D.

4. Dr. Ajay Sharma B.E., M.E., Ph.D.

### Assistant Professor

1. Dr. Piyush Chowdhary B.E.(Hons.), M.Tech, Ph.D. .

2. Dr.Suresh Singh Sankhla B.E., M.E. (Hons.), Ph.D.

3. Shri Shailesh Chowdhary B.E., M.E.

4. Mrs. Archana Gupta (Bohra) B.E.(Hons), M.E.

**B.E. II YEAR (CIVIL), 2013-14****III SEMESTER EXAMINATION SCHEME****A Written Papers**

<b>Branch Code</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Credits</b>	<b>Hours Per Week</b>			<b>Exam Hours</b>	<b>Marks</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
				<b>L</b>	<b>T</b>	<b>P</b>		
CE	201 A	Fluid Mechanics – I	4½	3	1	2	3	50
CE	202 A	Surveying	3½	2	-	3	3	50
CE	203 A	Construction Technology – I	5½	4	4	-	3	50
SE	204 A	Engineering Mechanics	4½	3	1	2	3	50
SE	205 A	Transportation Engineering-I	3	3	-	-	3	50
G	206 A	Engineering Geology	3	2	-	2	3	50
<b>Total (A)</b>			<b>24</b>	<b>17</b>	<b>6</b>	<b>9</b>	<b>-</b>	<b>300</b>

**B Practicals and Sessionals**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
CE	201 B	Fluid Mechanics – I	-	-	1	2	-	50
CE	202 B	Surveying*	-	-	-	3	-	50
CE	203 B	Construction Design, CAD & F-Elat.	-	-	4	-	-	50
SE	204 B	Engineering Mechanics	-	-	1	2	-	50
CE	205 B	Computer Programming & Application in Civil Engineering	2	-	1	3	-	50
G	206 B	Engineering Geology	-	-	-	2	-	50
<b>Total (B)</b>			<b>2</b>	<b>-</b>	<b>6</b>	<b>12</b>	<b>-</b>	<b>300</b>
<b>Grand Total (A+B)</b>			<b>26</b>	<b>14</b>	<b>6</b>	<b>12</b>	<b>-</b>	<b>600</b>

\*Note: There shall be a camp for a duration of about 10 days for an extensive field practice in Topographical surveying in II Year.

## B.E. II YEAR (CIVIL), 2013-14

## IV SEMESTER EXAMINATION SCHEME

## A Written Papers

Branch Code	Subject Code	Subject	Credits	Hours Per Week			Exam Hours	Marks
1	2	3	4	5	6	7	8	9
				L	T	P		
CE	251 A	Fluid Mechanics-II	3½	2	1	2	3	50
CE	252 A	Topographical Surveying	3½	2	-	3	3	50
CE	253 A	Construction Technology-II	3½	2	3	-	3	50
SE	254 A	Mechanics of Solids	4½	2	2	3	3	50
SE	255 A	Transportation Engineering-II	3	2	-	2	3	50
MA	201 A	Mathematics	2	2	-	-	3	50
<b>Total (A)</b>			<b>20</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>300</b>

1	2	3	4	5	6	7	8	9
<b>B Practicals and Sessionals</b>								
CE	251 B	Fluid Mechanics-II	-	-	1	2	-	50
CE	252 B	Topographical Surveying	-	-	-	3	-	50
CE	253 B	Construction Technology-II	-	-	3	-	-	50
SE	254 B	Mechanics of Solids	-	-	2	3	-	50
SE	255 B	Transportation Engineering-II	-	-	1	2	-	50
SE	256 B	Computer Application in Structural Engg.	2	-	-	3	-	50
<b>Total (B)</b>			<b>2</b>	<b>-</b>	<b>7</b>	<b>13</b>	<b>-</b>	<b>300</b>
<b>Grand Total (A+B)</b>			<b>22</b>	<b>12</b>	<b>7</b>	<b>13</b>	<b>-</b>	<b>600</b>

FE 287 E \*Co-curricular Activities 1 - 2 - 100

Joint award for III and IV Semester (\*Marks not counted for award of Division)

For a pass, a candidate must obtain

- (a) 35% in each written paper
- (b) 50% in each of the practicals and sessionals, and
- (c) 45% grand total

**B.E. III YEAR (CIVIL), 2014-15**

**V SEMESTER EXAMINATION SCHEME**

**A Written Papers**

Branch Code	Subject Code	Subject	Credits	Hours Per Week			Exam Hours	Marks
				5	6	7		
1	2	3	4	L	T	P	8	9
CE	301 A	Geotechnical Engineering-I	4	2	2	2	3	50
CE	302 A	Pipe Flow Hydraulics	4	2	2	2	3	50
CE	303 A	Geodesy	4	2	1	3	3	50
SE	304 A	Theory of Structures-I	3	2	2	-	3	50
SE	305 A	Structural Design- I (RCC)	4	2	2	2	3	50
SE	306 A	Structural Design-II (Steel)	3	2	2	-	3	50
<b>Total (A)</b>			<b>22</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>300</b>

1	2	3	4	5	6	7	8	9
<b>B Practicals and Sessionals</b>								
CE	301 B	Geotechnical Engineering-I	-	-	2	2	-	50
CE	302 B	Pipe Flow Hydraulics	-	-	2	2	-	50
CE	303 B	Geodesy*	-	-	1	3	-	50
SE	304 B	Theory of Structures-I	-	-	2	-	-	50
SE	305 B	Structural Design-I (RCC)	-	-	2	2	-	50
SE	306 B	Structural Design-II (Steel)	-	-	2	-	-	50
<b>Total (B)</b>			<b>-</b>	<b>-</b>	<b>11</b>	<b>9</b>	<b>-</b>	<b>300</b>
<b>Grand Total (A+B)</b>			<b>22</b>	<b>12</b>	<b>11</b>	<b>9</b>	<b>-</b>	<b>600</b>

\*Note : There shall be a Triangulation Survey Camp for a duration of about 15 days for an intensive field practice in Triangulation Surveying during III year BE (Civil) class.



**B.E. III YEAR (CIVIL), 2014-15**

**VI SEMESTER EXAMINATION SCHEME**

**A. Written Papers**

Branch Code	Subject Code	Subject	Credits	Hours Per Week			Exam Hours	Marks
				5	6	7		
1	2	3	4	L	T	P	8	9
CE	351 A	Geotechnical Engineering-II	4	2	2	2	3	50
CE	352 A	Open Channel Hydraulics	3½	2	3	-	3	50
CE	353 A	Photogrammatry & Remote Sensing	3½	2	-	3	3	50
SE	354 A	Theory of Structures II	4	2	2	2	3	50
SE	355 A	Structural Design III (RCC)	4	2	2	2	3	50
SE	356 A	Structural Design IV (Steel)	3	2	2	-	3	50
<b>Total (A)</b>			<b>22</b>	<b>12</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>300</b>

1	2	3	4	5	6	7	8	9
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**B. Practicals and Sessionals**

CE	351 B	Geotechnical Engineering-II	-	-	2	2	-	50
CE	352 B	Open Channel Hydraulics	-	-	3	-	-	50
CE	353 B	Photogrammatry & Remote Sensing	-	-	-	3	-	50
SE	354 B	Theory of Structures II	-	-	2	2	-	50
SE	355 B	Structural Design III (RCC)	-	-	2	2	-	50
SE	356 B	Structural Design IV (Steel)	-	-	2	-	-	50
<b>Total (B)</b>			<b>-</b>	<b>-</b>	<b>11</b>	<b>9</b>	<b>-</b>	<b>300</b>
<b>Grand Total (A+B)</b>			<b>22</b>	<b>12</b>	<b>11</b>	<b>9</b>	<b>-</b>	<b>600</b>

FE 387 E \*Co-curricular Activities 1 - 2 100

Joint award for III and IV Semester (\*Marks not counted for award of Division)

For a pass, a candidate must obtain -

- (a) 35% in each written paper
- (b) 50% in each of the practicals and sessionals, and
- (c) 45% grand total

**B.E. IV YEAR (CIVIL), 2015-16**  
**VII SEMESTER EXAMINATION SCHEME**

Branch Code	Subject Code	Subject	Credits	Hours Per Week			Exam Hours	Marks
1	2	3	4	5	6	7	8	9
<b>A Written Papers</b>				<b>L</b>	<b>T</b>	<b>P</b>		
CE	401 A	Environmental Engineering-I	4½	3	-	3	3	50
CE	402 A	Hydrology & Dams	4½	3	-	3	3	50
CE	403 A	Engineering Economics & Management	2	2	-	-	3	50
SE	404 A	Structural Design V (RCC)	4½	3	3	-		
SE	405 A	Structural Design VI (Steel)	4½	3	3	-	3	50
CE		Elective - I	2	2	-	-	3	50
<b>Total (A)</b>			<b>20</b>	<b>16</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>300</b>
1	2	3	4	5	6	7	8	9
<b>B Practicals and Sessionals</b>								
CE	401 B	Environmental Engineering-I	-	-	1	2	-	50
CE	402 B	Hydrology & Dams	-	-	-	3	-	50
SE	404 B	Structural Design V (RCC)	-	-	3	-	-	25
SE	405 B	Structural Design VI (Steel)	-	-	3	-	-	25
SE	435 B*	Estimating and Costing	2	-	2	2	-	25
SE	436 B*	ESA Lab	-	-	-	2	-	25
<b>Total (B)</b>			<b>2</b>	<b>-</b>	<b>9</b>	<b>9</b>	<b>-</b>	<b>200</b>
<b>Grand Total (A+B)</b>			<b>22</b>	<b>16</b>	<b>9</b>	<b>9</b>	<b>-</b>	<b>500</b>

## List of Electives

### (Any one of the following for CE: Elective I)

CE	411	A	Foundation Engineering
CE	412	A	Rural Water Supply and Sanitation Engineering
CE	413	A	Desert Technology
CE	414	A	Hydraulic Machines
CE	415	A	Dams
CE	416	A	Water Resources and Management
CE	417	A	Ground Water Hydrology
CE	418	A	Entrepreneurship Development
CE	419	A	Rock Mechanics

### (Any one of the following for SE: Elective II)

SE	461	A	Finite Element Method (C)
SE	462	A	Prestressed Concrete (C)
SE	463	A	Dynamics of Structures (C)
SE	464	A	Industrial Building Structures (C)
SE	465	A	High Rise Structures (C)
SE	466	A	Composite Structures (C)
SE	467	A	Introduction to Earthquake Engineering

VIII SEMESTER EXAMINATION SCHEME

A: Written Papers

Branch Code	Subject Code	Subject	Credits	Hours Per Week			Exam Hours	Marks
1	2	3	4	5	6	7	8	9
A. Written Papers				L	T	P		
CE	451 A	Environmental Engineering-II	4½	3	-	3	3	50
CE	452 A	Water Resources Engineering	4½	3	-	3	3	50
CE	453 A	Architecture & Town Planning	2	2	-	-	3	50
SE	454 A	Structural Design VII (RCC)	4½	3	3	-		
SE	455 A	Structural Design VIII (Steel & General)	4½	3	3	-	3	50
SE		Elective II	2	2	-	-	3	50
<b>Total (A)</b>			<b>20</b>	<b>16</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>300</b>

1	2	3	4	5	6	7	8	9
B. Practicals and Sessionals								
CE	451 B	Environment Engineering-II	-	-	-	3	-	25
CE	452 B	Water Resources Engineering	-	-	-	3	-	25
SE	454 B	Structural Design VII (RCC)	-	-	3	-	-	25
SE	455 B	Structural Design VIII (Steel)	-	-	3	-	-	25
<b>Total B</b>								<b>100</b>
CE/SE	C	Practical Training	1	-	-	-	-	75
CE/SE	C	Educational Tour	-	-	-	-	-	25
<b>Total (C)</b>			<b>1</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>
CE/SE	D	Project & Seminar	2	-	-	-	-	100
<b>Total (D)</b>			<b>2</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>
<b>Grand Total (A+B+C+D)</b>			<b>25</b>	<b>16</b>	<b>6</b>	<b>6</b>	<b>-</b>	<b>600</b>

FF 387 E \*Co-curricular Activities 1 - 2 - 100

Joint award for VII and VIII Semester (\*Marks not counted for award of Division)

For a pass, a candidate must obtain -

- (a) 35% in each written paper
- (b) 50% in each of the practicals and sessionals, and
- (c) 45% grand total

## **B.E. II Civil Engineering - III Semester**

### **CE 201 A: FLUID MECHANICS - I**

**2L, IT, 2P**

**3 HOURS, MM 50**

Introduction: Fluid, its physical properties. Ideal and Real fluids. Newtonian and Non-Newtonian fluids.

Principles of fluid statics: Pressure at a point, Absolute, gauge and vacuum pressures. Pressure measurements by manometers, Pressure gauges and Transducers. Total pressure and centre of pressure on plane and curved immersed surfaces.

Buoyancy, Floatation, Equilibrium of floating bodies, Metacentre and determination of metacentric height.

Kinematics of flow: Concepts of fluid flow – steady and unsteady flows, uniform and non-uniform flows, laminar and turbulent flows. Rotational and irrotational flows, Vorticity. Condition for two dimensional irrotational flows. Streaklines, streamlines and pathlines. Stream tubes, stream function. Continuity equation in Cartesian co-ordinates. Stream function and Velocity potential for two dimensional flow, Laplace equation. Flownet and its characteristics.

Equation of motion, energy and momentum applications: General hydrodynamic equations for total accelerations, Euler's equation of motion in Cartesian co-ordinates, integration of Euler's equation of motion to obtain Bernoulli's equation. Energy equation and its applications, Pitot tube, Fluid masses subjected to uniform accelerations. Free and forced vortex flows. Momentum equation and its applications, Navier Stoke's equation

### **CE 202 A: SURVEYING**

**2L, 3P**

**3 HOURS. MM 50**

Plane Table Surveying: Principle, advantages and disadvantages of plane table surveying. Plane table equipments including Indian pattern tangent clinometer and telescopic alidade, Adjustments, setting up of the plane table, leveling, orientation and centering, Different methods of plane table surveying, radiation, traversing, intersection and resection. Two & three point problems and their solutions.

Theodolite Surveying : Introduction : Measurement of horizontal and vertical angles, other uses of theodolite.

Errors in the measured values of horizontal and vertical angles and the procedures adopted in the field to eliminate/minimize the errors.

Permanent adjustments of standard vernier theodolite. Elementary idea of the micro-optic theodolites.

Theodolite Traversing: Various methods of theodolite traversing. Traverse computation, Gales Traverse Table, Systems of co-ordinates, Adjustment of traverse by Bowditch and Transit rules. Area of a closed traverse by Double Meridian Distance Method. Omitted measurements and their calculations.

Tacheometric Surveying: Theory of stadia tacheometer. Fixed hair stadia tacheometer and stadia rods. Instrumental constants, methods of observation with a fixed hair stadia tacheometer, horizontal and inclined sights, vertical and normal staff holdings. Reduction tables. Elementary treatment of self reducing tacheometers. Tangential tacheometry, substance methods of tacheometry. Errors and precision in tacheometric surveying.

Contours and contouring: Methods of representation of relief on a map. Definition of contours. Choice of contour: Contour interval, Characteristics of contours, Contour interval for various purposes, Contour gradients, Uses of contour maps. Direct and indirect methods of contouring. Interpolation of contours. Volume of reservoir from contour map.

Note: There shall be a camp for a duration of about 10 days for an extensive field practice in Topographical surveying in II Year.

### **CE 203: CONSTRUCTION TECHNOLOGY – I (Appendix-II)**

**4L, 4T**

**3 HOURS. MM 50**

**(A = 20 Marks, B = 30 Marks)**

#### **A- PART**

Selection of site of a building, planning for residential buildings. Orientation of buildings. Building bye laws- general concept. Functional requirements of building.

Mortars: Lime, Cement and mixtures

Concrete: Various concrete mixtures

Masonry: Stone, Brick.

Damp Proofing: Causes and effects of dampness: Parts of building likely to be affected most, various methods of damp proofing of buildings including basement and roof.

C.A.D. :- Use in Construction Technology

#### **B - PART**

Soil and rock, Solimass constituents. Definition of water content, Specific gravity, Void ratio, Porosity, degree of saturation, air voids, density index etc. Phase relationship.

Determination of water content. Specific gravity, particle size distribution, consistency limits, void ratio and density index, Classification of soil for Engineering use. Group index, Unified and I.S. Soil classifications, field identification tests. Soil structure, basis clay minerals. Flocculated and dispersed clays.

Bearing capacity of soil. Terzaghi's analysis of bearing capacity of shallow foundations, skempton's and hansen's formula, local and general shear failure. Bearing capacity determination by plate load test, standard penetration test and dutch cone test. Presumptive bearing capacity.

Principle of designing of deep and shallow foundation, safe compressive stresses in masonry and concrete, weights of different materials, equivalent dead loads of floors of building. Pile foundation: different varieties of piles in brief, pile driving machinery, pile cap (description only)

**SE 204 A: ENGINEERING MECHANICS****3L,1T, 2P****3 HOURS, MM 50**

Analysis of statically determinate pin-jointed frames method of joints, method of section and Graphical method.

Stress and strain – Hook's law, Tension, Compression and Shear, Complementary shear stress, Poisson's Ratio, Elastic Constants and their relation for an isotropic material. Temperature stresses and composite bars, elastic and plastic behavior of structural steel in tensile and compression tests. Principle planes, stresses and strain, Mohr's Circle diagram.

Solid friction, laws of friction, inclined plane screw jack, friction of plate collars, single and multiple disc clutches and cone clutches.

Mechanical advantage, velocity ratio and efficiency, study of simple machines e.g. screw jack, simple and compound differential wheel and axle, pulley blocks, winch crab single and double.

Transmission of power by belts and ropes, length of belts, tension in belts, centrifugal tension, maximum power transmitted by belts.

Bending moment and shearing force diagrams under static loads, concentrated, uniformly distributed and uniformly varying loads on cantilever, simply supported and overhanging beams.

Theory of simple bending, distribution of normal stress due to bending, section modulus.

Shear stress distribution in rectangular, circular, I, Tee and L-sections.

Torsion : Shear stress in solid and hollow circular shafts, angle of twist, power transmitted by shaft under pure torsion. Combined bending and torsion.

**SE 205 A : TRANSPORTATION ENGINEERING I (C)****3L****3 HOURS. MM 50**

General: Introduction: Principal modes of transportation , comparison and coordination History of Development of Road in India.

Highway Engineering: Highway Planning and Finance, Principle of highway planning, factors affecting, preparation of Master Plan, Highway Financing - Various Methods.

Traffic Engineering: Vehicular and Driver's characteristics, Reaction Time, PIEV theory, volume, speed and O and D studies . Traffic control methods, channelization , Road Intersection- Types, Traffic sign, signals and markings, Design of signal timings for two way intersection.

Geometric Design: Factors affecting and controlling highway alignment, preliminary and location survey, Factors governing Geometric design, Vehicle Dimension and Design speed, Highway capacity, lane width camber side slopes. Formation width, Widening on curves, Superelevation on curves.

Sight Distance: Stopping and overtaking, Gradients, grade compensation on curves, vertical curves.

Highway Material: Properties and tests on stone aggregates, bitumen and tar. Design characteristics of Bituminous concrete Mix - Marshal Method of mix design.

Pavment Design: Factors affecting design of Highway, Flexible and Rigid pavements, Introduction to Boussinesqu's and Burmister's formula, concept of Equivalent single wheel load, C.B.R. method of flexible pavement design. Construction and Maintenance:

Construction features of W.B.M., Bituminous and concrete Roads, specification for 20mm thick Premix Bituminous carpet and 50 mm thick grouted Bitumen Macadam.

Highway Maintenance: Brief Introduction of failure pattern and maintenance techniques for WBM, bitumen and concrete Roads.

Highway Drainage: Types of CD works.



**G 206 A: Engineering Geology****2L, 2P****3 HOURS. MM 50**

Earth Science and its branches. Introduction to engineering geology. Origin of Earth. Earth as a plane in the Solar System. Internal Structure of the Earth.

The theory of Plate tectonics, Continental drifts, Midoceanic ridges Island archs. Applications of the Plate tectonic theory.

Importance of weathering and erosion in Civil Engineering Geological work of river, glaciers, wind, Sea and Ground water.

Structural Geology : Bedding plane, Dip and Strike, Folds, Fault and unconformity, terminology classification and identification in the field and map. Geological maps and cross sections. Cross section preparation from individual maps of simple bedding. fold, fault or unconformity. Introduction to stereographic projections.

Stratigraphy : Principles of Stratigraphy. Geological Time Scale, Early Earth and Precambrians of India. (Dharwar, Guddapah, Aravalli, Delhi and Vindhyan Supergroup).

Earthquakes definition, Geological causes, measurement (Magnitude and intensity), Sismic zone of India. Aseismic designs. Volcanoes – their products and distribution.

Rocks : Igneous, Sedimentary and Metamorphic rocks, their classification, texture and structure; Engineering properties of rocks and rocks as engineering materials.

Drilling : Classification of drilling methods; Study in details of Diamond drilling and Hammer drilling; Advantages and limitation of diamond drilling.

Tunnels : Classification and Shapes; Hazards Structural, Lithological and groundwater; Payline and overbreak; Influence of geological factors; Geological investigation of bridges, building and embankments; Types of mass movements Classification , causes, their preventive measures, Importance in Civil Engineering.

**CE 205 B : Computer Programming & Application in Civil Engineering****1T, 3P****3Hrs, MM:50**

Programming element of C++: data types, operators, expressions, selection structures, repetition structures, functions, arrays, pointers, strings, classes, and operator overloading inheritance.

Programming applications: matrix manipulation, statistical analysis: Mean,, mode and median, maxima and minima, standard Deviations of discrete data and sorting, programming of problems in Civil Engineering.

**B.E. II Year Civil IV semester****CE 251 A : FLUID MECHANICS II (C)****2L, IT, 2P****3 HOURS. MM 50**

Flow through pipes: Reynold's experiment, Minor losses – loss of head due to sudden enlargement, sudden contraction, bend, entry and exit, loss of head due to friction – Darcy's Weisbach equation,. Hydraulic gradient and total energy lines. Pipes in series and parallel. Equivalent pipeline, Bye pass, Flow through branched and uniformly tapped pipes.

Flow measurement through pipes.

Transmission of power through pipes, Water hammer in pipes due to gradual and sudden closure of valve. Allevi's equation, Hydram.

Dimensional analysis and similitude: Dimensions and units of measurement. Principle of dimensional homogeneity. Buckingham's pi theorem. Dimensional analysis of typical flow problems. Hydraulic experimentation for determination of omitted and superfluous variables. Geometric, Kinematic and dynamic similarity. Important dimensional-less numbers and significance. Planning and operation of undistorted models of typical flow problems. Merits, demerits and planning of distorted models.

Flow through opening - Orifices, mouthpieces, nozzles, sluice gates, flow under varying head. Orifice discharging free, Jet, Vena contracta, co-efficient of contraction, velocity and discharge.

Notches and Weirs – rectangular, triangular and trapezoidal notches and weirs. Proportional weirs, Ogee profile, Flow under varying head.

**CE 252 A: TOPOGRAPHICAL SURVEY****2L, 3P****3 HOURS. MM 50**

Curves and curve ranging : Necessity of curves. Classification of curves-simple, compound, Reverse and vertical curves.

Element of Simple circular curves, methods of setting out a simple circular curve, obstacles in setting out of simple circular curves, Elementary treatment of Compound and Reverse curves.

Transition curves: Change of curvature, super elevation, Requirements of an ideal transition curve, super elevation. Modifications to the ideal transition curve. Methods of setting out a transition curve.

Vertical curves: Consideration of change of gradient and sight distance. Setting out of a vertical curve.

Hydrographic Surveying: Tide producing forces. Equilibrium theory, tide gauges. Establishment of mean sea level.

Sounding : Equipments used in sounding. Methods of sounding for various depths of water.

Location of soundings: Various methods of locating the sounding, three point problem and its solution by mechanical, graphical and analytical methods.

Introduction to Barometric leveling.

Tunnel Surveying. Necessity of tunneling, surface surveys and setting out.

Correlation of surface and underground surveys. Transfer of levels underground. Transfer of surface alignment to underground by Coplanning and Weisbach Triangle Methods.

### **CE 253 A: CONSTRUCTION TECHNOLOGY – II (Appendix-III)**

**2L, 3T**

**3 HOURS. MM 50**

Ventilation and Air Conditioning: Definition, necessity of ventilation, functional requirements of ventilation system. Systems of ventilations. Determination of rates of natural and mechanical ventilation. General consideration and rules for natural ventilations.

Air Conditioning : Principles of comfort air conditioning, system of air conditioning.

Roof:Sloping roofs, Corrugated sheet roofing, Jodhpur Stone Roofing and R.C.C. Roofing.

Stair Case : Planning and design of various types of Stair case and material.

Doors and Windows

Plastering : Lime,Cement, other material.

Floors: Various types, suitability for various purposes. Construction details. Floor Finishes, Composite floors, double flag stone, hollow tile floors and precast beam floors.

Shoring Under-planning and Scaffolding: Raking, horizontal, vertical shores, purpose and method of under – pinning. Different types of scaffolding.

Water Supply and Drainage: House connection alignment, laying and joining of service pipes and fittings. House Drainage, conservancy and water carriage systems, sanitary fitting, traps, soil pipe waste pipe, vent pipe, anti-syphonage pipe, inspection chamber, intercepting trap and soak pit.

Acoustics and Sound Insulation : General principles, sound absorbing materials, insulation of walls and floors.

Fire Protection: Behaviors of different materials such as timber, steel and concrete under fire and methods of their protection

Miscellaneous Topics : Principles of earthquake resistant construction, Expansion and construction, joints in buildings, Methods of thermal insulation of buildings.

Foundation layout method.

**SE 254 A : Mechanics of Solids****2L, 2T, 3P****3 HOURS. MM 50**

Strain Energy Resilience, proof resilience, strain energy for gradual, sudden and impact loading, strain energy due to shear.

Theories of Failures – Maximum Principal Stress theory, Maximum Principal Strain theory, maximum shear stress theory, maximum strain energy theory and maximum shear strain energy theory.

Theory of springs – Closed coil and open coil helical spring for axial pull, axial couple/Torque, carriage or leaf spring. Spring in series and parallel.

Thin Cylindrical and Spherical Shells – Longitudinal and hoop stresses for internal pressure, change in volume. Thin cylinder/Tube externally reinforced by external windings.

Slope and Deflection of Statically Determinate Beams – Moment-curvature relation, Governing differential equation, double integration method, singularity function for beams, Macaulay's method, moment area method, conjugate beam method, relation between maximum stress and maximum deflection. Deflection due to shear. Deflection of composite beams. Method of consistent deformation.

Fixed and Continuous Beams – Use of three moment theorem for solving statically Indeterminate Beams, drawing SFD BMD and deflected shape for simple static loading.

Columns and Struts – Elastic Instability, criteria for stability of equilibrium Euler's Theory for long columns for different end conditions, limitations of Euler's theory. Rankine's formula, Indian standard formula, Built-up columns.

**SE 255 A : Transportation Engineering II (C)****2L, 2P****3 HOURS. MM 50**

General : History of Development of Rail and Air Transportation in India.

Railway Engineering : Railway Track Assembly :- Permanent way, Gauge, Problem of having different gauges, track modulus, Rail joints, stresses in rails, creep and wear of rails.

Sleeper : Functions and requirements of an ideal sleeper, various types and their comparison, Rail to sleeper fixtures.

Ballast: Function and requirement of ballast, Materials used for ballast, Renewal of ballast and maintenance of track.

Railway Track –alignment – Basic principles and factors affecting geometric design of railway track, gradients, speed, Cant deficiency and negative cant curves, grade compensation on curves, Point and crossing, Turnouts, Symmetrical split, Switches double turnout, Diamond crossing, crossovers, single slip and double slip, Gauntlet track-Scissors crossover, Gathering lines. Railway Station and yards – Station site selection,

facilities required by passengers. Platforms: goods and passengers Yards : Goods and passengers yards, Marshalling yards, Station yards.

Airport Engineering : Airport Planning :- Regional planning, site selection, imaginary surfaces and zoning laws, Aircraft characteristics and controls their importance in airport planning and design. Runway orientation and design – Factors affecting; Wind rose diagram, cross wind component, Basic runway length, Runway length calculation, correction for elevation and temperature as per ICAO, Runway and Taxiway width, gradients; Minimum turning radius. Airport Layout and control :- Terminal Building, Apron, Hangers, Aircraft parking systems. Layout plans of an airport with single and multiple runway, Wind direction and Landing direction indicators. Airport lighting system, Airport drainage system (brief introduction)

**Ma 201 A : Mathematics****2L****3 HOURS. MM 50**

Differential Equation : Simultaneous differential equation. Total differential equations. Cauchy's or Euler's equations, initial and boundary value problems, Fourier transform, Laplace transform. Partial differential equations of first order.

Vector Calculus : Gradient, divergence, curl, Gauss, Stoke's and Green's theorem (Statement and verifications only)

Complex Analysis : Analytic functions, Complex integration, Cauchy's formula, Taylor's and Laurent's expansions, Conformal mapping. Contour integration.

Statistics and Probability : Correlation and regression, Binomial, Poisson and normal distribution, Theorems of probability and their applications.

**SE 256 B : Computer Application in Structural Engineering****1T, 3P****3Hrs, MM:50**

Roots of equations : Bisections method false position methods, Newton-raphson method, secant method.

Interpolation : Linear and quadratic interpolations, Newton's and Lagrange's interpolating polynomials.

Solution of Simultaneous linear algebraic equations : Gauss elimination method, Gauss-Jordan method.

Application of numerical methods in various structural Engineering problems.

Introduction to software package related to structural design.

**III B.E. Civil Engineering – (V Semester)****CE 301 A :Geotechnical Engineering I****2L,2T,2P****3 HOURS. MM 50**

Soil water, Permeability of soil and its determination, Field pumping out test. Factors affecting permeability. Permeability of stratified soil deposits.

Seepage and seepage pressure. Quick sand phenomena. Effective and total pressures. Change in effective stresses due to water flow conditions. State water Table and steady flow condition. Laplace equation for seepage. Flow net and its uses, its construction by graphical and electrical analogy methods. Piping; uplift pressure, Principle of drainage by Electro-osmosis.

Principle of soil compaction. Laboratory compaction, standard and modified proctor compaction tests, Jodhpur Minicompactor test, Proctor needle. Determination of field density. Field compaction and its control.

Vertical pressure distribution in soil. Boussinesq's, equation. Vertical stress due to circular, rectangular and strip loaded areas, Newmarks chart and approximate methods, pressure bulb and its significance in foundation exploration. Contact pressure distribution.

Settlement of foundation : Immediate, consolidation and differential, minimum depth of foundation. Proportioning of footings.

Deep foundation: Types , functional classification of piles. Pile load capacity by dynamic and static formula. Pile load test, group effect.

Foundation in Blake Cotton Soil. C.B.R. Test and its application. Sub grade modules and its determination.

**CE 302 A : Pipe Flow Hydraulics****2L,2T,2P****3 HOURS. MM 50**

Laminar Flow: Simple solution of Navier Stokes equations, Hagen-Poiseuille's equation, Plane Poiseuille flow and Couette flow, Effect of Viscosity on Fluid flow:, Shear stress distribution, Equation of motion for laminar flows, Stoke's law, Measurement of viscosity, Flow through parallel plates, Laminar flow through pipes, cavitation.

Turbulent Flow: Nature of turbulence, Reynold's momentum exchange concept and Prandtl's mixing length theory, Turbulent flow in pipes, equation for velocity, distribution and friction coefficient, velocity distribution in smooth pipes, rough pipes. Nikuradse's curves, Moody's diagram.

Introduction to boundary layer theory, Development of boundary layer over a thin flat plate, Laminar and turbulent boundary layers, boundary layer thickness and boundary shear (by momentum integral equation), boundary layer separations and control. The Prandtl boundary layer equation. Solution for laminar boundary layer. Smooth and rough flat surfaces.

Flow round a body – Drag, Skin friction drag, Pressure drag and friction drag on two dimensional bodies submerged bodies. Wave drag, lift induced drag, Flow past sphere and cylinder.

**CE 303 A : Geodesy****2L,1T,3P****3 HOURS. MM 50**

Field Astronomy: Elementary spherical trigonometry and expressions required in solving spherical triangle (with out proof). Definitions of various astronomical terms. Systems of co-ordinates.

Time : Sidereal time, Apparent Solar Time, Mean Solar Time, Standard Time, Acceleration and retardation of time. Conversion of one time into another. Elementary idea of Ephemerical time, Corrections to observed altitude. Determination of azimuth of a survey line and watch (chronometer) error by extra-meridian observation of Sun and stars Talcott's method, its advantages. Convergences of meridians.

Triangulation: Principle, Classification of triangulation system (order of triangulations), Types of triangulation chains. Reconnaissance survey, Selection of triangulation stations. Strength of figures. Station markers and signals. Indivisibility of station and height of towers. Satellite stations and reduction to center. Base-line measurement. Correction to measured lengths. Extension of base-line.

Theory of errors and Survey adjustments: Classification of errors, Laws of accidental errors. Weighting of observation. Principle of least squares. Most probable values of directly and indirectly observed independent quantities. Probable error. Computations for the adjustment of a braced quadrilateral by least square method and approximate method and a polygon with a central station by least square method and Equal shift method.

Trigonometrical levelling : Curvature and atmospheric refraction, single and reciprocal observations, Eye and object (axis-signal) correction.

Note : There shall be a Triangulation Survey Camp for a duration of about 15 days for an intensive field practice in Triangulation Surveying during III year BE (Civil) class.

**SE 304: Theory of Structures-I (C)****2L,2T****3 HOURS. MM 50**

Fundamental approaches/methods. Statically Determinate structures v/s statically indeterminate structures, conditions of geometry force/flexibility method, displacement/stiffness method/displacement method.

The slope-deflection method, Derivation of slope-deflection method fundamental assumptions, application of slope deflection method for solving statically indeterminate beams and portal frames (with and without inclined members) and drawing SFD, BMD and deflected shape.

The moment distribution method : Basic concept, stiffness and carry over factors. Distribution factors. Application of moment distribution method for solving statically indeterminate beams and portal frame (with and without inclined members) and draw SFD, BMD and deflected shape

Force method

Method of strain energy: basic concept, strain energy in linear elastic system, castigliano's energy theorems, derivation application of Castigliano's energy theorem, Maxwell's reciprocal theorem, Willot-Mohr diagram

Analysis of statically indeterminate beams and frames: Law of reciprocal deflection, theorem of least mode analysis of statically indeterminate beams and frames by minimum strain energy



Analysis of statically indeterminate trusses: Degree of indeterminacy, application's of castigliano's theorem, Maxwell's method, stresses due to lack of fit, combined stresses. Externally Indeterminate trusses. Trussed Beam.

### **SE 305 : Structural Engineering Design-I (RCC) (C)**

**2L,2T,2P**

**3 HOURS. MM 50**

Ingredient of cement concrete-cement, fine and coarse aggregates, water, chemical and mineral admixtures. Processes of concreting. Specification and tests for fresh and hardened concrete. Stress-strain curve, modulus of elasticity, creep and shrinkage of concrete. Types of cement and concrete. Properties and types of reinforcement-codal provisions

Basic design concepts. Limit state design method, use of IS 456 provisions. Behavior, analysis and design of flexural,Members: Singly and doubly reinforced rectangular and 'T' section

Design of one way, two way slab panels, flat slabs (direct design method)

Design of form work for beam, slabs and columns

Note : use of IS 456 is permitted in exams.

### **SE 306 : Structural Engineering Design-II (Steel)**

**2L,2T**

**3 HOURS. MM 50**

Introduction to design – working stress method and limit state method. Factor of safety and permissible stresses, partial safety factor for loads and material, types of structural steel and section classification. Various loads on structures, floors and roofs.

Types of connections-Bolted and welded joints, ordinary black bolts, turned bolts, high strength bolts. Axially and eccentrically loaded joints, Design of brackets, Prying forces.

Design of axially and eccentrically loaded tension members by LSD. Mode of failure, Lug angles.

Design of compression members by LSD, Axially and eccentrically loaded columns, Design of lacings and battens for built – up columns, Design of slab and gusseted base plate.

Design of Beams by limit state design. Simple and plated beams, web buckling and web crippling, laterally supported and unsupported curtailment of plates.

Note:

(i). All design to confirm to IS:800 - 2007

(ii). The use of IS: 875, IS: 800 and structural hand book no. 01 shall be allowed in the examination.

**B.E. III Year Civil (VI Semester)****CE 351 A : GEOTECHNICAL ENGINEERING-II****2L,2T,2P****3 HOURS. MM 50**

Mohr circle of stress, shear strength of soil, its strength of sand and clays. Sensitivity and thixotropy, skempton's pore pressure coefficient. Stress path (introduction).

Active, passive and at rest earth pressures, rank and coulomb's earth pressure theories, rebhann's and culmann's construction for cohesionless soil back fill. Uniformly distributed surcharge. Bell's equation for cohesive back fill. Stability of retaining wall, earth pressure on sheet piling and bulkheads.

Stability of slopes. Causes of slope failures. Stability analysis by Swedish and friction circle method for total and effective stresses, Taylor's method. Stability under sudden drawdown condition, Remedial measures.

One-dimensional consolidation of soil, Consolidation test. Terzaghi's one-dimensional consolidation theory and its use in predicting rate of settlement. Total and differential settlements. Over consolidated and normally consolidated soils.

Site investigation. Depth of exploration. Distributed and undisturbed samples. Types of samples. Brief description of procedures of boring and sampling. Depth, number and extent of bore holes for various structures.

Soil stabilisation, Mechanical stabilisation with lime, cement, bitumen, hydroscopic and water proofing chemicals. Electrochemicals and thermal stabilisation.

**CE 352 A: Open Channel Hydraulics****2L,3T****3 HOURS. MM 50**

Flow through open channels: Uniform steady flow in open prismatic channels, Discharge formulae of Chezy's, Manning's, Bazin's and Kutter's. Most economical section, Conveyance of a channel section, Specific energy and discharge curves. Alternate depth and critical depth. Critical state of flow. Hump and channel contraction, Broad crested weir, Parshall flume.

Dynamic equation of gradually varied flow in prismatic channels, Classification and analysis of surface curves, Computation of surface curve by step method.

Rapidly varied flow, Hydraulic jump in prismatic channels, Specific force curve, Conjugate depths, Hydraulic jump elements and energy loss, Location of the jump, surges and waves.

Hydraulic turbines: Impact of free jet on curved vanes, Velocity vector diagrams. Types of hydraulic turbines, determination of vane angles, main dimensions and efficiencies. Study of Pelton, Francis and Kaplan turbines, Bulb turbines.

Governing of hydraulic turbines, Surge tank, Unit quantities, Specific speed, Characteristic curves and their uses. Problem of cavitation in turbines, Selection of turbines.

Centrifugal Pumps: Energy recuperation devices – volute casing, vortex chamber and diffuser ring. Pump efficiencies. Effects of variation of discharge and speed of the pump, Specific speed. Characteristics curves. Pumps in series and parallel. Multistage pumps and compressors.

**CE 353A : Photographic Surveying & Remote sensing.**

**2L,3P**

**3 HOURS. MM 50**

Photographic Surveying. Scope of Photographic Surveying in cartography. Terrestrial Photography : Principles of ground photogrammetry dealt in an elementary manner.

Aerial Photogrammetry: Perspective, treated in an elementary manner. Geometry of aerial photographs. Tilt and height displacement and radial line assumptions.

Flight planning, controls for photographic surveys. Radial line methods of plotting details.

Elementary Stereoscopy: Monocular and Binocular vision, Stereoscopic Parallax. Absolute parallax, Floating marks, Stereo-meter, determination of elevations by parallax measurements.

Introduction to Photo interpretation and Remote Sensing.

Electronic Surveying: Principles, working of Geodimeter. Tellurometer and distomat Radar system. Accuracy of different electronic distance measuring methods.

Trilateration Surveys: A brief introduction to trilateration Surveys.

**SE 354 : Theory of Structures-II (C)****2L,2T,2P****3 HOURS. MM 50**

Rolling loads on beams and statically determinate trusses, shear force and bending moments due to concentrated loads, uniformly distributed loads-longer and shorter than the span, equivalent distributed load.

Influence lines for shear force, bending moments, stress and deflection for simply supported beams and statically determinate trusses, Muller-Bresleau principle.

Arches : Linear arch, Eddy's theorem. B.M.SF and axial thrust in three and two hinged arches. Moving loads for three and two hinged arches, rib shortening and temperature stresses

Suspension bridges and stiffening girders: suspension cables, anchor cables, tension in cables, temperature stresses, shape of cable under its own weight and a given system of loading. Three hinged and two hinged stiffening girders : influence lines for BM and SF temperature effect in stiffening girder.

Approximate methods of multi-storey. Frame analysis vertical and lateral load analysis of multi-storied frames. Degree of indeterminacy, assumption for vertical and lateral load analysis, portal method and cantilever method.

**SE 355 : Structural Engineering Design-II (RCC) (C)****2L,2T,2P****3 HOURS. MM 50**

High performance concrete : Role of microstructure. Mix design for compression and flexure using chemical and mineral admixtures and various types of cement, durability aspects-deterioration, exposure condition, cement content. Water-cement ratio, cover to rebar, consideration for fire, acceptance criteria, non-destructive testing technique.

Analysis and design of compression members : Axially loaded columns. Axial load and uni-axial bending

Design of isolated and combined footing.

Design of retaining walls-cantilever and counterfort types design of staircases (excluding spiral type)

Note : use of IS 456 is permitted in exam.

**SE 356 A : Structural Engineering Design-IV Steel (C)****2L,2T****3 HOURS. MM 50**

Design of grillage foundation for individual column and two columns beam columns connection-framed, unstiffened and stiffened seated connections

Design of Gantry girder, impact effect

Design of riveted and welded plate girders under dead and superimposed loads-flanges area and moment of inertia method.

Splicing of web and flanges. Intermediate stiffeners-vertical horizontal and bearing stiffeners. Curtailment flange of plates.

Roof trusses : type of trusses, economical spacing of trusses, design loads, design of purlins, struts, ties and joints including shoe joint

Note : 1. All design to conform to IS : 800 – 2007, IS: 875

2. The use of I.S. 800, I.S. 875 and structural hand book no. 01 shall be allowed in the examination.

**B.E. Final Civil Engineering (VII Semester)  
CE 401 A: Environmental Engineering I  
(Water Supply Engineering)**

3L,3P

3Hrs, MM:50

Sources of water supply, quantity of water per capita variation in seasonal and hourly consumption. Forecast of pollution. Standards of purity for public water supplies Flow Diagram. Lakes and rivers intakes. Raw water pumping. Aeration, simple sedimentation and chemical precipitation. Quiescent and continuous flow types of tanks. Design of coagulation. Filtration – slow sand filters, Rapid sand filters. Disinfection – uses of excess lime, ozone, ultraviolet rays, chlorine and chloramines for disinfection, water softening.

Different types of pipes used in water supply practice, joints in pipes, valves, distribution of water, Design of distribution system. Alignment, laying and jointing of pipes, Service reservoir and fittings service connection, detection and prevention of wastage of water, Metering, Rural Water Supply.

**CE 402 A : HYDROLOGY & DAMS**

3L,3P

3 HOURS, MM:50

Hydrology : Descriptive hydrology, hydrological cycle, hydrologic budget.

Precipitation: Precipitation, measurement and related data analyses, Hydrologic abstractions, Water losses, Evaporation and its estimation, transpiration, evapotranspiration, measurement of evapotranspiration, infiltration.

Quantitative hydrology: Rainfall Runoff relationships, estimation quantity of runoff, flood estimation.

Hydrograph : Storm hydrograph, factors affecting flood hydrograph, analysis : PMP, unit and synthetic hydrographs, its application, storage routing.

Floods and their management, PMF; Streams and their gauging; Routing of floods; Capacity of Reservoirs. Regression and Correlation analysis.

Ground water : Forms of subsurface water, Aquifer properties and well irrigation: source of ground water, types of wells, steady flow into a well, Unsteady flow in a confined aquifer, well loss, specific capacity, Ground water budget, construction, yield, maintenance and development of wells.

River Engineering – River morphology; River training, embankments and Dikes, guide banks, groynes, Levees, spurs, Pitched island, cut off, bed pitching , butter panelling, design of launching apron, Revetment for bank protection, Classification rivers on alluvial plains – degrading, aggrading and meandering.

Sediment transport – Origin and formation of sediments, stream erosion and deposition, definition of regime of flow, plane bed, ripple and dune regime, transition regime, anti-dune regime, introduction to bed loads, saltation, suspended load and wash load.

Reservoir planning : Reservoir, economic considerations, environmental effects, yield, capacity of reservoir, mass curve for inflow and demand. Reservoir sedimentation, site selection and flood routing through reservoirs.

Dams : Basic principles for design and construction features of dams and spillways, forces on gravity dam, stability analysis, causes of failure, stress analysis, elementary profile, design of gravity dams, foundation treatment. Structural joints, keys and water seals, galleries, outlets.

Earth dams : Types, methods of construction, design and stability analysis. Estimation and control of seepage, slope protection. Introduction and brief description of Arch, Buttress dams, rockfill dams, coffer dams.

Hydro-Power : General features and components of hydropower station

### **CE 403 A : Engineering Economics and Management**

**2L**

**3Hrs, MM:50**

Principle and explanation of economic terms: Land, labour, capital, rent, wages, interest, production. Law of return, scale of industry, Location of industry, internal and external economics, Price determination under perfect competition and monopoly conditions, Derivation of revenue and cost curves, Index number.

Monetary Economics: Money – standard, token, limited and unlimited legal tender, credit instrument – promissory notes, drafts, cheques, hundies, bills of exchange, Bank – Central, Commercial, Industrial, Co-operative and mortgage.

Taxation – Principle of incidence

Contracts – types and conditions.

Business organisation – Sole proprietorship, partnership and joint stock companies, Different kinds of shares and debentures, co-partnership and profit sharing, Nationalisation of industries, State enterprise, monopoly.

Industrial Relations – Trade Unions and their functions. Strikes and lockouts, Prevention and settlement of disputes, Unemployment and its solution.

Management – Scientific management and relations.

Rationalisation, qualities of good manager, office organisation, works organisation, organisation and management of stores.

Accounts – Double entry system, cash book, journal and ledger, profit and loss account, valuation of business assets for balance sheet, trial balance, bad debts and depreciation.

### **SE 404 : Structural Engineering Design-V (RCC) (C)**

**3L,3T**

**3 HOURS. MM 50**

Design of continuous beams on non-yielding supports

Design of rectangular portal frame (one storey one bay) with different support conditions

Analysis of beams curved in plan : Ring beams uniformly loaded and supported on-equispaced columns : Arcate beams fixed at the ends and uniformly loaded

Analysis and design of a R.C. spherical dome for uniformly distributed load with or without a central load.

Design of overhead tanks : Rectangular, circular and intze type (membrane analysis only)

Design of staging. Design of circular raft foundation

Note: Following references can be used in exam:

1. The use of IS 456 - 2000
2. The use of SP 16 design aids to IS 456 and

3. Reinforced concrete designer's handbook by Reynolds and Steedman shall be allowed in the examination

### **SE 405 : Structural Engineering Design-V (RCC) (C)**

**3L,3T**

**3 HOURS. MM 50**

Types of bridges : Through type and deck type bridges, plate girder and truss girder bridges, different type of truss bridges : Limiting spans and economical span

Standard loading for railways and highway bridges : Tractive effort, braking forces and wind forces

Principles of design of through and deck type bridges.

Design of plate girder bridges : Lateral bracings, cross frames and bearing

Design of railway bridge: Design of stringers or rail bearers, cross girders and main girders, design of lateral bracing, sway and portal bracings

Design of Roller and rockers bearing

Introduction of light gauge sections : Description only, different shapes, stiffened and unstiffened, post buckling strength

Use of high tensile bolts in joints of bridge trusses (description only)

Influence lines for Pratt, Warren, Baltimore, Pettit and 'k' type trusses, influence lines for cantilever and three pines arch bridges

Note 1. The need of IS – 800 – 2007, IS – 875 and ISI hand book no. 01 shall be allowed in the examination.

2. Us of railway bridges rules and code of practice of steel bridges (Railway board) I.R.C. codes I and II, IS: 1915 and ISI Structural hand book no. 01 shall be allowed in the examination.

### **CE 411 A Elective I: Foundation Engineering**

**2L**

**3Hrs, MM:50**

Shallow foundations; Failure modes. Effects of foundation shape, eccentricity and inclination of load. Terzaghis and Mayerhof's approaches. Bearing capacity computations, I.S. method.

Influence of water table. Influence of adjacent footings, bearing capacity of a footing on stratified deposits. Settlement of footings on sands and clays, permissible total and differential settlement of structures Foundation of swelling soils. Combined footing and strap footing, mat footing.

Deep foundations : Type of piles. Allowable load. Pile load test. Pile group bearing capacity and settlement. Group action in piles.

Well foundations: various shapes, depth of well foundation, forces acting, well curb, cutting edge, steining, bottom plug, well sinking, construction.

Plate load test and Penetration tests and their applications in the design of shallow and deep foundations.

Machine foundations, Introduction to dynamic loads on soil foundation Natural frequency of foundation soil system, Barken's method, bulb of pressure concept, Design criteria for reciprocating and impact type machines.

**CE 412A Elective I: Rural Water Supply & Sanitation****2L****3Hrs, MM:50**

Rural Water Supply: Importance of village community in India, conditions of Indian villages with special regard to economic, social and health aspects. Quality of water needed for village community, Sources of water for village water supplies. Types of wells of sanitary aspects in well construction. Disinfections of wells. Different types of pumps used for village wells. Operation and maintenance of pumps, water borne diseases. Quantity of water Human and Cattle population and their water requirement Rate of water supply standards of potable water. Rain water storage.

Treatment of water – Disinfection, desalination, defluoridation, Distribution of water.

Communicable diseases : Disease and immunity, communicable disease sources, mode of transfer. Control of communicable diseases.

Fly and Mosquito control. Life cycle of flies and mosquitoes. Various methods of fly and mosquito control.

Milk and food sanitation. Essentials of dairy farm and cattle shed sanitation. Tests for milk and dairy products. Food epidemics, food poisoning Botulism. Rural sanitation, village latrines, Aqua privies, storm water and sullage problems, animal waste, methods of composting. Biogas collection and disposal of refuse.

Septic tank, percolation pits, sub surface disposal. Composting, Digestion for methane and manure recovery.

**CE 413A Elective I: Desert Technology****2L****3Hrs, MM:50**

Desert: Definition, characteristics of desert area, world deserts Desertification and its control.

Types of sand dunes and their characteristics.

Water supply, sanitation and housing problems in desert areas, and their remedy.

Water harvesting. Dry land agriculture and soil conservation.

Problems of constructing roads, their maintenance and remedial measures in desert areas.

Mineral resources in desert areas.

Medicinal plants and food plants of desert areas.

Solar, wind and Geothermal energy; Bio gas plants.

Soil salinity and alkalinity

Animal wealth of desert areas



**2L****3Hrs, MM:50**

Impact of jets : Impact of jets on plane and curved stationary and moving vanes; Velocity vector diagrams.

Hydraulic Turbines : Types of hydraulic turbines, determinations of vane angles, main dimensions and efficiencies; Study of Pelton wheel, Francis turbine, Caplan turbine and Bulb turbine.

Governing of hydraulic turbines : Surge tank; Unit quantities, specific speed, characteristic curves and their uses; Problem of cavitations in turbines; Selection of turbines.

Centrifugal Pumps: Energy recuperation devices – volute casing, vortex chamber and diffuser ring; Pump efficiencies; Effects of variation of discharge and speed of the pump; Specific speed.

Characteristic curves; Pumps in series and parallel; Multistage pumps.  
Submersible pump: Elementary study.

**2L****3Hrs, MM:50**

General: Various types of dams; Site selection for dams and reservoirs; Cofferdams; Reservoir sedimentation; Trap efficiency and determination of useful life; Salient features of important dams in Rajasthan and India.

Geology of dam site: Site investigation and their interpretations; Suitability of site for dam foundation; Treatment of foundation; Grouting.

Gravity dams: Forces acting – uplift pressure, wave pressure and seismic forces, load combinations; Determination and distribution of shear, normal and principal stresses; Stability analysis with and without seismic forces; Practical profile of a gravity dam; Zones of a gravity dam; Design of first four blocks of a high gravity dam; Single step design method; Free-board determination; Control of shrinkage and cracking of concrete in gravity dams; Transverse and longitudinal joints, galleries, and stress concentration in gravity dams.

Embankment dams: Safety criteria and design requirements; Zoning of dam section; General requirement for materials and compaction; Construction pore pressure and its determination; Seepage through body of the dam – phreatic line for different cases, quantity of seepage and its control; Control of seepage through foundation; Design of filter, relief well, and impervious blanket; Stability analysis of homogeneous and composite earth dams under steady seepage and sudden draw-down cases by slip arc method and sliding wedge method; Conduits through earth dams; protection of upstream and downstream slopes; Rockfill Dam – problems of design, different types of membranes, settlement, and construction methods.

Arch and buttress dams: Arch dam – general considerations, different types, constructional features, basic design criteria and design of constant radius & centre and variable radius & centre arch dams by thin cylinder theory; Buttress dams – component parts, different types, constructional features, basic design criteria and design of deck and buttress.

### **CE 416 A Elective I: Water Resources Planning and Management**

**2L****3Hrs, MM:50**

Water Resources and their space-time distribution in global, national and state wise perspective, integral approach to water resources planning and development.

Hydrological appraisal of water resources. Data collection, processing and frequency analysis. Assessment of water needs and planning objectives. Study of alternatives and selection of optimal project size. Multiple objective, Planning, Environmental considerations in water resources projects planning.

Legislative aspects. Water laws and policy. Machinery for interstate and international disputes, case study.

Mathematics of finance – interest, present value, annuity, cost comparison and comparison of alternative proposals. Benefits and their determination; tangible and intangibles, Benefit cost analysis, Selection of a project, preparation of feasibility report. Problems of Project financing.

**2L****3Hrs, MM:50**

General Introduction: Importance of study; Ground water in hydrologic cycle; Soil properties favorable for ground water; Vertical distribution of ground water; Geological formation; Different type of aquifers; Aquifer parameters.

Ground water movement: Darcy's law, and its range of validity; Streamline; Velocity potential; Stream function; Continuity equation for ground water flow; Laplace equation; General hydrodynamic equation for two dimensional ground water flow; Inhomogeneity; Anisotropy; Boundary conditions; Flownet.

Well hydraulics: Differential equation governing ground water flow; Dupuit-Forchheimer assumptions; Steady unidirectional flow; Steady and unsteady radial flow to a fully penetrating well in confined and unconfined aquifers; Test pumping analysis with steady and unsteady flows; Introduction to flowing wells and stream depletion; Method of image for wells near stream and impermeable boundaries; Collector wells; Partially penetrating wells; Interference of wells; Well loss; Specific capacity and efficiency of wells; Design, construction, development and maintenance of wells.

Ground water modeling: Necessity and objectives; Sand tank models; Hele-Shaw models; Thermal analog models; Electrical analog models; Introduction to Finite difference models; Introduction to mathematical modeling of a ground water basin.

Ground water management: Ground water budget; Consumptive use; Ground water quality - standards and measures of quality, sources of pollution and their preventive measures; Artificial recharge of ground water - requirements and importance, water spreading and well methods of recharge, and recharge mounds; Saline water intrusion-sources, depth and shape of fresh-saline water interface, upconing, interface in island, and control measures against intrusion.

### **CE 418 A Elective I: Entrepreneurship Development**

**2L****3Hrs, MM:50**

Entrepreneurship and Economic Development. Definition of Entrepreneurship and economic growth.

Achieving societies. Wage V/S Self employment Utilisation of local resources and import substitution.

Achievement motivation : Identification of traits of an entrepreneur, Goal setting, risk taking leadership, decision marking time management and problem solving. Self assessment. Entrepreneurial goal setting. Linking self with opportunities.

Entrepreneurial skills, Creativeness, hindrance to creativity, developing creativity, traits of creative persons. Leadership qualities and interpersonal skills.

Communication – Type of communication, Barriers in effective communication.

Enterprise Management : Managerial decision making, goal setting, Analytical tools for decision analysis.

Organisation Design and personal management. Product Management. Production management-Planning production resources, Forecasting planning and setting production level and delivery schedule. P.P.C., quality control.

Financial Management- Financial management and accounting in small enterprise.

Assessing financial needs of enterprise. Fixed and working Capital. Cash flow and financial ratios.

Product costing – cost components. Fixed and Variable costs, sales price and revenue.

Break even analysis. Product pricing.

Enterprise Engineering : Interaction with known and existing industries. Need analysis, Identification of local resources.

Sources of information : Information from Governemnt Agencies and consultancy organisation; Information from market, Market Survey; Product selection, Selection of appropriate technology, Assessment of energy and manpower requirement, Quality assurance. Techno-economic feasibility. Sources of finance Prevalent incentives and their impact on profitability.

### **CE 419A Rock Mechanics**

**2L**

**3Hrs, MM:50**

Rock classification, Structural features of rock-masses, Engineering classification of intact rocks, Rock-mass classification based on rock fabrics, Classification based on rating concept.

N.G.I. quality index classification system.

E.Factors controlling durability and strength of rocks, Engine ring properties of rocks. Laboratory tests for permeability, uniaxial compression, tensile strength, direct shear test and triaxial shear test. Rock characteristics affecting the effects of blasting.

Strength of massive, jointed and fractured rock masses. Evaluation of stresses in rock before excavation. Analysis of stability of rock slopes and cuttings. The fracture of rock around underground openings and excavations. Support of underground structures. Rock bolts and dowels, Grouting.

**B.E. Final Year (VIII Semester)  
CE 451A: Environmental Engineering II  
(Waste Water Engineering)**

**3L,3P****3Hrs, MM:50**

Systems of drainage, Surface drainage, Under drainage, Separate, Combined and Partially combined system. House drainage – conservancy and water carriage systems, Stoneware pipes, junctions, Intercepting traps, grease traps, Gulleys water closets urinals baths and lavatory basins soil, waste and antisiphonage pipes. Alignment and gradient of drains. Inspection chambers. Testing of drains. Ventilation of drains.

Layout of sewerage systems, Design of sewers Quantity of sewage per capita, Estimating storm water by time of concentration method. Forms, cross section and inclination of sewers appurtenances, Manholes, Flushing of sewers. Ventilation of sewers. Principles of sewage treatment. Aerobic and anaerobic bacterial action. Sewage screening, grit separation, sewage pumping, Disposal of sewage by dilution and land sedimentation with chemical precipitation. Septic tank, Imhoff tank, contact beds, percolating filters. Activated sludge process. Nature of sewage sludge. Sludge treatment, sludge gas rural sanitation. Collection and disposal of refuse.

**CE 452 A : Water Resources Engineering**

**3L,3P****3Hrs, MM:50**

**Irrigation Practices :** Irrigation and its importance, assessment of water requirements for crops, factors affecting water-requirement of crops, consumptive use of water, determination of irrigation water requirement, command area, delta, duty, base period, relation between delta, duty and base period, Kor depth and Kor period. factors affecting duty and methods of improvement, methods of irrigation, canal and well irrigation comparison.

**Canal irrigation :** Canal alignment, design principles of irrigation, curves in canals, canal losses, estimation of design discharge of a canal, design by Kennedy and Lacey's theories, Tractive force concepts in canal design, construction and maintenance, canal outlets, lining of canals.

**Canal Head Works :** Selection of site, components parts, Weirs and Barrages, Bligh's and Khosla theory, Computation of uplift pressure and exit gradient.

**Canal Regulation Structures :** Canal fall, types, Sarda fall, Glacis fall, Design of Distributary head regulator, Cross regulator, control of sediment entry into an offtaking canal, canal escapes.

**Cross-drainage structures :** Needs, types of cross drainage (CD) structures, selection of suitable CD structures, design of cross-drainage structures, waterway and headway of the stream, head loss through cross-drainage structures, energy dissipation.

Canal outlets, ejectors and extractors, tail escape, fish ladder.

Spillways, gates and outlet works, types of spillways, dynamic force on overflow spillways, energy dissipation below spillways, wing wall.

Introduction and brief description of various types of crest gates, sluice ways, intake and trashrack.

Water-logging – Definition, adverse effects of water-logging, causes of water-logging, anti-water logging measures, Drainage system design.

## CE 453 A : Architecture and Town Planning

2L

3Hrs, MM:50

### (A) Architecture:

Definition of architecture, its importance and scope

A general analytical study of the evolution of building in various countries through constructions and constructional materials:

- (i) Growth of simple construction from natural and man made materials like stone, brick and timber : Construction basis in ancient Egypt, Greece and India (Jain, Buddhist, Dravidian and Hindu Architecture).
- (ii) Arch construction in stone and brick, as in Assyria Persia, Roman and India (Muslim period).
- (iii) Composite construction of arches. Vaults and Ribbed Vaults, etc. as in early Christian, Byzantine, Romanesque and Gothic architecture.
- (iv) Advanced methods of a composite construction as in Renaissance, contemporary and modern construction with variety of forms.  
Analytical Study of Aesthetics in Building. Principle qualities and influencing factors of arch :
  - (i) Physical appeal in building through forms, shape, mass, tone and texture.
  - (ii) Constructional material and details as governing agents of beauty materials, constructional members, openings, projections, decoration and protective details.
  - (iii) Abstract principles of intellectual appeal such as unity, Contrast, balance, character, utility, symmetry expression of purposes etc.

### (B) Town Planning :

- (i) Brief history of birth and growth of town.
- (ii) Definition and scope of town planning. Concept of Town Planning. Physical Planning and Social Planning.
- (iii) Principles governing selection of site and town layout. Basic elements of city plan.
- (iv) Transportation and communication. Traffic problems and remedies. Segregation and channelisation of traffic, urban roads, functions, layouts parking, problems and solutions.
- (v) Open space provision and standards.
- (vi) Land use Pattern and Zoning, Industrial Concept of zones and interrelationship. Neighbourhood planning, garden city concept, satellite town.
- (vii) New trends in Town planning – Housing schemes, Future of towns, aesthetics of towns, landscape.
- (viii) Development of existing cities. Master Plan, Slum clearance and building bye laws.
- (ix) Town planning in ancient and modern India.

**SE 454 A : Structural Engineering Design VII RCC (C)****3L, 3T****3Hrs, MM:50**

Design of a rectangular slab with the concept of yield line theory  
 Introduction to I.R.C. codes for bridges. Design of slab culvert and T beam bridges  
 Application of courbon's theory. Use of Pigeand's coefficients  
 Design of bearings . Design of sub-structures elements  
 Prestressed concrete – Advantages, methods or prestressing  
 Analysis of rectangular and I section. Design of a simple beam of rectangular section  
 (excluding end block)

Note : Following references can be used in exam

1. The use of IS 456
2. The use of SP 16
3. The use IRC section, I,II & III and
- 4.Reinforced concrete designer's handbook by Renyonld and Streedman shall be allowed in the examination

**SE 455 A : Structural Engineering Design VIII – RCC (C)****3L,3P****(Steel and General)****3Hrs, MM:50**

Design of rectangular and circular overhead steel storage tanks: Design of staging.  
 Design of steel and masonry. Chimney, stacks excluding their foundation.  
 Space structures : Analysis of statically determinate simple space frames. Fundamentals of the plastic theory for steel structures, plastic analysis, design of continuous beams. Portal frames, gable frames.

Note 1. The need of IS :800 - 2007 IS : 875 and ISI hand book no. 01 shall be allowed in the examination.

**SE 461 A : Finite Element Methods (C)****2L****3Hrs, MM:50**

Introduction to finite element method. Basic concept of finite element (F.E.) analysis of structures. Finite element analysis of an elastic continuum : Displacement approach, Direct formulation energy integral, Co and Cil continuity, convergence criteria  
 Elements : Types and properties. Conforming and non conforming  
 Shape function L General families for one and two dimensional elements, pascal triangle, serendity and langrangian family. Sper, sub and Iso parametric elements plane stress and plane strain problems, constant strain triangle. Steps in finite element analysis of an elastic continuum  
 Natural coordinates and numerical integration (one and two dimensional cases)

**SE 462 A : Prestressed Concrete (C)****2L****3Hrs, MM: 50**

Prestressing systems and devices. Analysis and design of element for flexure, losses in pressure strength in flexure, shear and Torsional Behaviour, Transmission and Anchorage zone, composite sections subjected to flexure, statically indeterminate structures.

**SE 463 A : Elective II - Dynamics of Structures (C)****2L****3Hrs, MM: 50**

Source of vibration, types of vibration, degree of freedom, spring action and damping : viscous and coulomb's damping. Single Degree of freedom system : undamped and damped and free and forced vibration (harmonic): Response to unit impulse and arbitrary loading by Duhamel's integral for SDOF system (Ramp and Pulse loading). Vibration measuring instruments. Vibration isolation, Response to ground motion and transmissibility. Introduction to multi degree of freedom system. Use of Codal provisions for earthquake resistant design IS : 13827, IS : 13828, IS : 13920, IS : 13935. Note: Use of IS : 1893 shall be allowed in exams.

Systems, subject to Transient Forces, Introduction of multi degree freedom system.

**SE 464 A : Industrial Building Structures (C)****2L****3Hrs, MM: 50**

Simple industrial building and steel mill buildings. Analysis and design of major components – roof trusses, gantry girder, side rails, eaves girder, sagrods, gable rafter, gable wind girder, vertical side bracing, Analysis and design of industrial bents, columns and bracket connections

Note: 1. All design to conforms to IS: 800 - 2007 and IS: 875

2. The use of IS 800, IS 800 IS-875 and ISI structural hand book no. 01 shall be allowed in the examination.

**SE 465 A : ELECTIVE – HIGH RISE STRUCTURES (C)****2 L****3 Hrs., MM : 50**

Basic concepts of structural systems.

Effect of creep, shrinkage, fire.

Analysis : Approximate methods for gravity and lateral loads – portal, cantilever, substitute frame.

Design of Frame (Skeletal), shear wall (planer) structures.

**SE 466 A : ELECTIVE-COMPOSITE STRUCTURES (C)****2L****3 Hrs. MM 50**

Introduction to composite structural members, mechanics of composite action. Shear connectors-types and design considerations. Composite Beams, Floors and columns-design consideration. Structural joints for different elements.



**SE 467 A ELECTIVE II- Introduction to Earthquake Engineering****2L****3 Hrs., MM 50**

Earthquakes, causes of earthquakes and their characteristics. Elastic rebound theory, plate tectonic theory. Movement of Indian plate. Past earthquake : India, World. Intensity and magnitude : Scales – Richter, Modified Mercali, MSK. Response spectra. Tsunami, Types of Seismicwaves, Epicentre, Hypocentre, focus, Iso seismals. Consequences of Earthquake, Seismic zoning map of India. Seismic instruments. Strong ground motion characteristics : Near and far field problems. Selection of design earthquake. Methods of analysis for seismic loading. Factors affecting performance of structures under earthquakes. Base isolation, Ductile detailing.

**Ma 211 A: Special Mathematics-I****(For Diploma Passed Candidates - common for all branches)****2L****3 Hrs. MM : 50**

Differential Calculus :Asymptotes, curvature, envelops evolutes, concavity, convexity and singular points curve tracing

Integral Calculus : Rectification and quadature. Volumes and surfaces of solids of revolution, mean values of functions, differentiations under sign of integration

Differential Equations : Differential equations of first order and first degree, Equations of the first order but not of the first degree. Linear differential equations with constant coefficients, Homogeneous Linear differential equations, second order differential equations with variable coefficients.

**Ma 261 A: Special Mathematics-II****(C,CHE,CSE,EC,E,IT,M,MI & PI)****2L****3 Hrs. MM : 50**

Statics: Composition and resolution of coplanar forces, moments, Equilibrium of coplanar force acting at a point, equilibrium of three forces on rigid body, friction, common catenary.

Dynamics velocity, Rectilinear motion under constant acceleration, Vertical motion under gravity, Rectilinear motion under variable law of forces and also in resisting medium. Kinematics of uniplanar motion.



