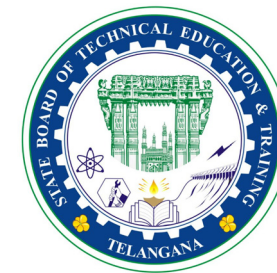

CURRICULUM – 2014
(C-14)

DIPLOMA IN
CIVIL ENGINEERING

1



State Board of Technical Education & Training
Telangana State
HYDERABAD

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CURRICULUM (C-14) FOR DIPLOMA COURSES IN Telangana

I. PREAMBLE

The State Board of Technical Education and Training, **Telangana** under the aegis of the Department of Technical Education, Telangana generally reviews the Curricula once in every five years. However, recognizing the changing needs as stated by the user industries, the Board has decided to bring forward the revision of curriculum. Consequently, the Board with the assistance of NITTTR, Chennai under the guidance of Prof. C. Nagendra Rao, performed the evaluation of C-09 Curriculum in force. On finding the merits and demerits of C-09 Curriculum the faculty have made a thorough assessment of the curricular changes that have to be brought in. It was felt that there is an urgent need to improve hands-on experience among the students pursuing diploma courses. Further, the urgency of enhancing communication skills in English was also highlighted in the feedback and suggestions made by the user industries. Keeping these in view, a number of meetings and deliberations were held at district and state level, with experts from industry, academia and senior faculty of the department. The new Curricula for the different diploma courses have been designed with the active participation of the members of the faculty teaching in the Polytechnics of Telangana, besides reviewed by Expert Committee constituted with eminent academicians.

The primary objective of the curricular change is to produce best technicians in the country by correlating growing needs of the industries with the academic input.

The revised New Curriculum i.e., Curriculum – 2014 or C-14 is vetted by NITTTR, Chennai followed by BoG approval of SBTET for its implementation with effect from 2014-15.

Salient Features:

1. Duration of course is either 3 years / 3½ years duration of Regular Academic Instruction.
2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.
3. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in

Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.

4. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the Industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are introduced in IV and V semesters respectively for all the branches except Chemical Engineering and Chemical Engineering (Sugar Technology) for which life skills is introduced at 3rd semester level..
5. In addition to Engineering Mathematics in I year (Mathematics -102) and III semester (Mathematics-301), Mathematics-401 has been introduced in the IV semester of present syllabus.
6. Modern topics relevant to the needs of the industry and global scenario suitable to be taught at Diploma level are also incorporated in the curriculum.
7. CAD specific to the branch has been given more emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.
8. Every student is exposed to the computer lab at the 1st year itself in order to familiarize himself with skills required for keyboard/mouse operation, internet usage and e-mailing.
9. The number of teaching hours allotted to a particular topic/chapter has been rationalized keeping in view the past experience
10. Upon reviewing the existing C-09 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In the revised C-14 curriculum, more emphasis is given to the practical content of Laboratories and Workshops, thus strengthening the practical skills.
11. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedure based. While the course content in certain subjects is reduced, in rest of the subjects the content has been enhanced as per the need.
12. A new subject "**Field Practices**" is introduced in 5th Semester. In Field Practices, the students will perform all the industry oriented activities for all types of Field tastings and make use of the machinery, equipment and tools actually used in the industry. By this, the student will get first-

hand experience of performing various practical procedures and field experiments to enhance their skills.

13. All Practical subjects are independent of each other and the practice of grouping two or more practical subjects is dispensed with.
14. Curriculae of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available at the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to conform to the field requirements of industry.
15. The Members of the working group are grateful to Sri Ajay Jain, I.A.S., Commissioner of Technical Education & Chairman, S.B.T.E.T. and Smt.Sailaja Ramaiyer, I.A.S., for their guidance and valuable inputs in revising, modifying and updating the curriculum.
16. The Members acknowledge with thanks the cooperation and guidance provided by the Sri. D. Venkateswarlu, Secretary, SBTET, Telangana and Dr. CN Rao, Professor and Head, NITTTR, ECH and other officials of Directorate of Technical Education and the State Board of Technical Education, Telangana, experts from industry, academia from the universities and higher learning institutions and all teaching fraternity from the Polytechnics who are directly and indirectly involved in preparation of the curricula.

II. RULES AND REGULATIONS

1. ADMISSION PROCEDURES :

1.1 DURATION AND PATTERN OF THE COURSES

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of Academic Instruction.

All the Diploma courses are run on year wise pattern in the First year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses like Diploma in Electronics with specialization in CP/ CN/ IE/ TV/ BM/ Embedded systems, the training will be in the seventh semester.

1.2 PROCEDURE FOR ADMISSION INTO THE DIPLOMA COURSES:

Selection of candidates is governed by the Rules and regulations laid down in this regard from time to time.

- i) Candidates who wish to seek admission in any of the Diploma courses will have to appear for Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Telangana, Hyderabad.

Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).

- a) The candidates seeking admission should have appeared for the X class examination, conducted by the Board of Secondary Examination, Telangana or equivalent examination thereto, at the time of making application to the Common Entrance Test for Polytechnics for admissions into Polytechnics (POLYCET). In case of candidates who apply pending results of their qualifying examinations, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of interview for admission.
- b) Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Telangana from time to time.
- c) For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.

1). D.H.M.C.T. 2). D.Pharmacy

1.3 MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

1.4 PERMANENT IDENTIFICATION NUMBER (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., a Permanent Identification Number (PIN) will be allotted to each candidate so as to facilitate this work and avoid errors in tabulation of results.

1.5 NUMBER OF WORKING DAYS PER SEMESTER / YEAR:

- a). The Academic year for all the Courses usually shall be from Fifteenth June of the year of admission to the 31st March of the succeeding year.
- b). The Working days in a week shall be from Monday to Saturday
- c). There shall be 7 periods of 50 minutes duration on all working days.
- d). The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to cover the syllabus.

1.6 ELIGIBILITY OF ATTENDANCE TO APPEAR FOR THE END EXAMINATION

- a). A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.
- b). Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.
- c). Candidates having less than 65% attendance shall be detained.
- d). Students whose shortage of attendance is not condoned in any semester / 1st year are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / 1st year when offered next.
- e). A stipulated fee shall be payable towards condonation for shortage of attendance.

1.7 READMISSION

Readmission shall be granted to eligible candidates by the respective RJD / Principal.

- 1) Within 15 days after commencement of class work in any semester (Except industrial Training).
- 2) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non Engineering Diploma streams).

Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work, after readmission is granted.

2. SCHEME OF EXAMINATION

2.1 a) First Year

THEORY EXAMINATION: Each Subject carries 80% marks with examination of 3 hours duration, along with 20% marks for internal evaluation. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

PRACTICAL EXAMINATION: There shall be 40% Marks for regular practical work done, i.e. sessional marks for each practical subject with an end examination of 3 hours duration carrying 60% marks. However, there are no minimum marks prescribed for sessionals.

b) III, IV, V and VI Semesters:

THEORY EXAMINATION: Each subject carries usually 80 marks and 40 marks in respect of specified subjects of 3hours duration, along with 20/ 10 marks for internal evaluation (sessional marks) respectively.

PRACTICAL EXAMINATION: Each subject carry 30/60 marks of 3hours duration 20/40 sessional marks.

2.2 INTERNAL ASSESSMENT SCHEME

- a) Theory Subjects: Theory Subjects carry 20 % sessional marks, Internal examinations will be conducted for awarding sessional marks on the dates specified. **Three unit tests will be conducted for I year students**

and two Unit Tests for semesters. Average of marks obtained in all the prescribed tests will be considered for awarding the sessional marks.

- b) Practicals: Student's performance in Laboratories / Workshop shall be assessed during the year of study for 40% marks in each practical subject. Allotment of marks should be discrete taking into consideration of the students skills, accuracy, recording and performance of the task assigned to him / her. Each student has to write a record / log book for assessment purpose. In the subject of Drawing, which is also considered as a practical paper, the same rules hold good. Drawing exercises are to be filed in seriatum.
- c) Internal assessment in Labs / workshops / Survey field etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Lecturer / Senior Lecturer / Workshop superintendent as the case may be.
- d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective head of the department preferably choosing a person from an Industry. Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.
- e) Question Paper for Practicals: Question paper should cover all the experiments / exercise prescribed.
- f) Records pertaining to internal assessment marks of both theory and practical subjects are to be maintained for official inspection.
- g) **In case of Diploma courses having Industrial Training**, the training assessment shall be done and marks be awarded in the following manner.

Industrial assessment	:	200 marks (in two spells of 100 marks each)
Maintenance of log book	:	30 marks
Record Work	:	30 marks
Seminar / viva-voce	:	40 marks

TOTAL	:	300 marks

The assessment at the institute level will be done by a minimum of three members Internal Faculty, Industrial Experts and H.O.D. and be averaged.

- h) In case of Diploma courses **not having Industrial Training** in the curriculum, the students shall make **Industrial visits** as per the schedule given below:

S.No	Semester	Nature of Training/Exposure	Duration
1	III Semester	Industrial Visits	5 no. (One week)
2	IV Semester	Industrial Visits	5 no. (One week)
3	End of Semester Vacation of IV Semester	Industrial Training	4 Weeks
4	V Semester	Industrial Visits	5 no. (one Week)
		Simulated Industrial Training (Field Practices)	3 Weeks
5	VI Semester	Industrial Visits	5 no. (one Week)
Total			11 Weeks

NOTE: No Marks shall be awarded for the above industrial visits. However, it will be evaluated as satisfactory/unsatisfactory.

2.3 MINIMUM PASS MARKS

THEORY EXAMINATION:

For passing a theory subject, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

PRACTICAL EXAMINATION:

For passing a practical subject, a candidate has to secure, a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical examination marks put together. In case of D.C.C.P., the pass mark for typewriting and short hand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand subjects of D.C.C.P course.

2.4 PROVISION FOR IMPROVEMENT

- Improvement is allowed only after he / she has completed all the subjects from First Year to Final semester of the Diploma.
- Improvement is allowed in any 4 (Four) subjects of the Diploma.
- The student can avail of this improvement chance only once, that too within the succeeding two examinations after the completion of Diploma, with the condition that the duration including Improvement examination shall not exceed FIVE years from the first admission.

- No improvement is allowed in Practical / Lab subjects or Project work or Industrial Training assessment. However, improvement is allowed in drawing subject.
- If improvement is not achieved, the marks obtained in previous Examinations hold good.
- Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.
- Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.
- All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued else the submitted originals will be returned.

3 RULES OF PROMOTION TO NEXT LEVEL :

7

3.1 For Diploma Courses (Except HMCT, Architecture, Chemical-Sugar & Auto mobile Engineering) From 1ST YEAR TO 3rd, 4th, 5th, 6th and 7th Semesters:

- A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance and pays the examination fee. However, he/she can be condoned on Medical grounds upto 10% (i.e. attendance after condonation on Medical grounds should not be less than 65%) and he/she has to pay the condonation fee along with examination fee.
- A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.
- A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pays the examination fee. A candidate who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester exam if he/she

- i) Puts the required percentage of attendance in the 4th semester
- ii) Should not have failed in more than Four backlog subjects of 1st year
4. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee on fulfilment of 3(i)(ii) clauses stated above. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.

A candidate is eligible to appear for the 5th semester exam if he/she

- i) Puts the required percentage of attendance in the 5th semester
- ii) Should have obtained eligibility to appear for 4th Semester examination.

For IVC students.

- i) Puts the required percentage of attendance in the 5th semester
- ii) Should have appeared for 4th Semester examination.
- iii) Should not have failed in more than Four backlog subjects of III Semester
5. A candidate shall be promoted to 6th semester provided he/she has puts the required percentage of attendance in the 5th semester and pay the examination fee, a candidate who could not pay the 5th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6th semester.

A candidate is eligible to appear for 6th semester examination if he/she

- i) Puts the required percentage of attendance in 6th semester and
- ii) Should not have failed in more than six backlogs subjects of 1st year, 3rd & 4th semesters put together.

For IVC students.

- i) Puts the required percentage of attendance in the 6th semester
- ii) Should have obtained eligibility to appear for V semester examination.
- iii) Should not have failed in more than Six backlog subjects of III & IV Semester put together.

3.2 For HMCT, Architecture and Chemical - Sugar courses

- 1) The same rules are applicable on par with other diploma courses with the exception that the Industrial Training is in the 5th semester.
- 2) A candidate shall be promoted to 5th semester (Industrial Training) provided he/she puts the required percentage of attendance in the 4th semester and pay the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by the SBTET from time to time before commencement of 5th semester (Industrial Training).
- 3) A candidate shall be promoted to 6th semester of the course provided he/she has successfully completed the Industrial Training (Passed).
A candidate is eligible to appear for the 6th semester examination if he/she
- (i) Puts the required percentage of attendance in 6th semester.
- (ii) Should not have failed in more than six backlog subjects of 1st Year, 3rd & 4th semesters put together.

For IVC students

- i) Puts the required percentage of attendance in the 6th semester
- ii) Should have completed the Industrial Training.
- iii) Should not have failed in more than Six backlog subjects of III & IV Semester put together.

3.3 For Automobile Engineering Course

The same rules are applicable on par with other diploma courses with the exception that the Industrial Training is in the 6th semester. A Candidate shall be promoted to 6th semester provided he/she puts the required percentage of attendance in 5th semester and pay the examination fee. A candidate, who could not pay the 5th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of 6th semester (Industrial Training).

Or

The Automobile Engineering Industrial Training may be shifted to 5th semester on par with **HMCT/ARCH/CH (ST)**

3.4 For Diploma Courses of 3 ½ Years duration:

3.4.1 MET/ CH/ CHPP/ CHPC/ CHOT/ TT

1. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.
2. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.
3. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester exam if he/she

- i) Puts the required percentage of attendance in the 4th semester
- ii) Should not have failed in more than Four backlog subjects of 1st year.
4. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.
5. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case would be 90 % attendance and attends for the VIVA-VOCE examination at the end of training.
6. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training (Passed).
A candidate is eligible to appear for 7th semester examination if he/she
 - i) Puts the required percentage of attendance in the 7th semester and
 - ii) Should not have failed in more than 6 backlog subjects of 1st year, 3rd and 4th semesters put together.

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- iii) Should not have failed in more than six backlog subjects of 3rd and 4th semester put together for IVC students.

3.4.2 For Diploma Courses of 3 ½ Years duration:

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- i) In respect of Diploma in Footwear Technology, the Industrial training is offered in two spells, the 1st spell of Industrial training after the First Year (i.e. III semester of the course) and the second spell of industrial training after the V semester (i.e VI Semester of the course). The promotion rules for this course are on par with the other sandwich Diploma courses except that there is no restriction on number of backlog subjects to get eligibility to appear for the 4th semester examination and ,

A candidate is eligible to appear for 5th semester examination if he/she

1. Puts the required percentage of attendance in the 5th semester and
2. Should not have failed in more than four subjects of 1st year.
- ii) A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed second spell of Industrial Training (Passed).
A candidate is eligible to appear for 7th semester examination if he/she
 1. Puts the required percentage of attendance in the 7th semester and
 2. Should not have failed in more than 6 backlog subjects of 1st year and 4th semesters put together.
 3. Should not have failed in more than six backlog subjects of 4th and 5th semester
put together for IVC students.

3.4.3 For Diploma Courses of 3 ½ Years duration:

BM

The same rules as are applicable for conventional courses also apply for these courses. Since the industrial training in respect of these courses is restricted to one semester (6 months) after the 6th semester (3 years) of the course.

A candidate shall be promoted to 7th semester provided he/she puts the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET

from time to time before commencement of the 7th semester (Industrial Training).

OR

Run through system for 1st Year and 3rd semester to 6/7th semester provided that the student puts in 75% of attendance (which can be condoned on medical grounds upto 10%) i.e. attendance after condonation on medical grounds should not be less than 65%.

3.5 OTHER DETAILS

- In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.
- The I spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.
- The Second spell of Industrial training shall commence within 10 days after the completion of I spell of Industrial training.
- Each Semester of Institutional study shall be a minimum of 90 working days. (With 6 working days in a week i.e. from Monday to Saturday, with 7 periods of 50 minutes, duration per day.

4 STUDENTS PERFORMANCE EVALUATION

4.1 AWARD OF DIPLOMA

Successful candidates shall be awarded the Diploma under the following divisions of pass.

- First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
- First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.
- Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.

The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.

With respect to the intermediate vocational candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall alone be taken into consideration for

determining the overall percentage of marks secured by the candidates for award of class/division.

- Second Class shall be awarded to all students, who fail to complete the Diploma in the regular three years and four subsequent examinations, from the first admission.

4.2 EXAMINATION FEE SCHEDULE:

The examination fee should be paid as per the notification issued by State Board of Technical Education and Training from time to time.

4.3 STRUCTURE OF END EXAMINATION QUESTION PAPER:

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular subject be considered.

Examination paper is of 3/6/9 hour's duration.

- Each theory paper consists of Section 'A' and Section 'B'. Section 'A' contains 10 short answer questions. All questions are to be answered and each carries 3 marks Max. Marks: 10 x 3 = 30.

Section B contains 8 essay type questions including Numerical questions, out of which 5 questions each carrying 10 marks are to be answered.

Max.Marks: 5 x 10 = 50.

Total Maximum Marks: 80.

- For Engineering Drawing Subject (107) consist of section 'A' and section 'B'. Section 'A' contains four (4) questions. All questions in section 'A' are to be answered and each carries 5 marks. Max. Marks: 4 x 5=20. Section 'B' contains six (6) questions. Out of which four (4) questions to be answered and each question carries 10 Marks. Max. Marks 4 x 10 = 40.

Practical Examinations

For Workshop practice and Laboratory Examinations,

Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise : 50%

Max. Marks for VIVA-VOCE : 10%

Total : 60%

In case of practical examinations with 50 marks, the marks will be worked out basing on the above ratio.

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

4.4 ISSUE OF MEMORANDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, Telangana. for each duplicate memo.

4.5 MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES:

Maximum period for completion of the course is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

4.6 ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfils the following academic regulations.

- i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.
- ii. He / she has completed all the subjects.

Students who fail to fulfill all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

4.7 RECOUNTING, ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT & REVERIFICATION:

- 4.7.1 a) A candidate desirous of applying for Recounting/ issue of Photo copy of valued answer scripts/ Reverification should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 within 15 days from the date

of receipt of Tabulated Marks Statement by the Principal of concerned Polytechnic or the date specified.

Recounting shall be done for any **TWO** theory subjects per Year/Semester only, including drawing subjects. No request for recounting shall be entertained from any candidate who is reported to have resorted to Malpractice in that examination. The fee prescribed for Recounting should be paid by way of Demand Draft drawn on any Scheduled Bank payable at Hyderabad in favour of the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad. The verification of the totaling will be done by an Officer of the Board and will be intimated to the candidate by post only.

The following documents should be invariably be enclosed with the application failing which the application will not be considered.

1. Marks secured as per Tabulated Marks Sheet certified by the Principal.
2. Demand draft towards the payment of fee
3. Self – addressed and stamped envelopes of 11" X 5" size.

The applications received after the prescribed date will not be accepted and any correspondence in this regard will not be entertained.

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4.7.2 FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

1. A candidate desirous of applying for Photo copy of valued answer script/ scripts should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 along with the required fee in the form of Demand Draft within 07 days from the date of receipt of Tabulated Marks Statement by the Principal of concerned Polytechnic or the date specified in the covering letter whichever is earlier.
2. Photo copies of valued answer scripts will be issued to all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application
 - (1) Marks secured as per Tabulated Marks Sheets certified by the Principal
 - (2) Self-addressed Stamped Envelope/Cloth-line cover of size 10" x 14".
 - (3) Fee in the form of Demand Draft

4.7.3 FOR RE-VERIFICATION OF THE VALUED ANSWER SCRIPT

1. A candidate desirous of applying for Re-verification of valued answer script should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 along with the required fee in the form of Demand Draft, within 15 days from declaration of result.
2. Re-verification of valued answer script shall be done for all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application failing which the application will not be considered.
 - (i) Marks secured as per Tabulated Marks Sheets certified by the Principal.
 - (ii) Fee in the form of Demand Draft.

4.7.4 MALPRACTICE CASES:

If any candidate resorts to any Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per rules and regulations framed by SBTET from time to time.

4.7.5 DISCREPANCIES/ PLEAS:

Any Discrepancy /Pleas regarding results etc., shall be represented to the Board within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

5 ISSUE OF CERTIFICATES AND VETO

5.1. ISSUE OF DUPLICATE DIPLOMA

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, Telangana on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and *non-traceable certificate* from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET from time to time.

5.2 ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

5.3 GENERAL

- i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.
- ii. All legal matters pertaining to the State Board of Technical Education and Training are within the jurisdiction of Hyderabad.
- iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET is final.

V SEMESTER

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DIPLOMA IN CIVIL ENGINEERING SCHEME OF INSTRUCTIONS AND EXAMINATIONS V Semester

Subject Code	Name of the Subject	Instruction period / week		Total Period / year	Scheme of Examination			
		Theory	Practical		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
C-501	Design & Detailing of R.C. Elements	5	-	75	3	20	80	100
C-502	Environmental Engineering - I	4		60	3	20	80	100
C-503	Quantity Surveying - II	5	-	75	3	20	80	100
C-504	Irrigation Engineering	5	-	75	3	20	80	100
C-505	Project Management for Construction	4	-	60	3	20	80	100
PRACTICAL:								
C-506	Computer Applications for Project Management	-	3	45	3	40	60	100
C-507	Civil Engineering Drawing - II	-	6	90	3	40	60	100
C-508	Life skills	-	3	45	3	40	60	100
C-509	Field practices	-	7	105	3	40	60	100
TOTAL		23	19	630		260	640	900

- Note:** 1. Five local industrial visits / Interaction should be arranged during the semester period (One week).
2. Three weeks simulated industrial training (Field practices) should be arranged to enable the students to have hands on practice.
3. The students are supposed to submit the report on the significance of Field practices.
4. **Industries:** Exposure on reading and interpretation of structural Engineering Working drawings / Sewage and sewerage treatment plants and Irrigation structures

DESIGN AND DETAILING OF R.C. ELEMENTS

Subject Title	:	DESIGN AND DETAILING OF R.C. ELEMENTS
Subject Code	:	C-501
Periods/Week	:	05
Periods/Semester	:	75

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Type	Essay Type
1.	Introduction to R.C.C and Principles of Working Stress Method	08	10	-	01
2.	Philosophy of Limit State Design	04	06	02	-
3.	Analysis and Design of Rectangular Beams	15	26	02	02
4.	Design of Slabs	12	16	02	01
5.	Analysis of T-beams	08	13	01	01
6.	Design of continuous slabs and beams	10	16	02	01
7.	Design of columns	10	13	01	01
8.	Design of footings	08	10	-	01
	Total	75	110	10	08

OBJECTIVES

Upon completion of the subject the student shall be able to

- 1.0 Understand the Loads to be considered and importance of IS Codes and principles of working stress design**
- 1.1 Differentiate Cement concrete and reinforced cement concrete.
 - 1.2 Explain the need for reinforcement in plain concrete
 - 1.3 List the advantages and disadvantages of R.C.C.
 - 1.4 List the material used in R.C.C. and their functions in R.C.C.
 - 1.5 State the reasons for using steel as reinforcement.
 - 1.6 List the different codes used in RCC
 - 1.7 List the Loads to be considered in the design of R.C. elements.
 - 1.8 State the different methods of designing R.C. elements.
 - 1.9 State the different grades of concrete and different permissible stresses in concrete (Working Stress Method) as per IS 456 – 2000.
 - 1.10 Differentiate the nominal mix concrete and design mix concrete.

- 1.11 Write the equations of tensile strength and modulus of elasticity of concrete as per IS 456 – 2000.
 - 1.12 State the following properties of concrete:
 1. Poisson's ratio,
 2. Creep,
 3. Shrinkage,
 4. Workability and
 5. Unit weight.
 - 1.13 List different types of steel and their permissible stresses in steel (Working Stress Method) as per IS 456 – 2000.
 - 1.14 State modulus of elasticity and unit weight of steel.
 - 1.15 State the assumptions made in Working Stress Method as per IS 456 – 2000.
 - 1.16 Define modular ratio, know
 - 1.17 Write the equation of modular ratio in working stress method
 - 1.18 Sketch the stress distribution and transformed area of R.C. section.
 - 1.19 Define:
 1. Effective depth,
 2. Neutral axis,
 3. Lever arm and
 4. Moment of resistance.
 - 1.20 Describe the following with sketches:
 1. Balanced section,
 2. Under reinforced section and
 3. Over reinforced sections
 - 1.21 Calculate the following for a singly reinforced rectangular beam:
 1. Neutral axis,
 2. Lever arm and
 3. Moment of resistance
 - 1.22 Design a singly reinforced rectangular beam subjected to flexure.
- 2.0 Introduction to Limit state Design**
- 2.1 Define Limit State.
 - 2.2 State different limit states.

- 2.3 Distinguish 'strength' and 'service ability' limit states
- 2.4 Know the different IS: 456 – 2000 code provisions for Limit state method of design.
- 2.5 Define 1. 'characteristic strength' of materials and 2. 'characteristic loads'
- 2.6 Differentiate 'Nominal Mix' and 'Design Mix'
- 2.7 Explain the role of partial safety factors in limit state design.
- 2.8 Define 1. 'Design strength of materials' and 2. 'Design loads'
- 2.9 State the assumptions made in the limit state design.
- 2.10 State the differences between the working stress method and limit state method of design of R.C. elements.
- 3.0 Understand the principles of analysis and design of singly reinforced and doubly reinforced R.C.C rectangular beams, by limit state method.**
- 3.1 Sketch stress diagram and strain diagram for a singly reinforced rectangular beam indicating appropriate stress and strain values in compression zone and tension zone of the beam, also the strain value at the junction of parabolic and rectangular stress blocks.
- 3.2 Calculate the depth of rectangular and parabolic stress blocks.
- 3.3 Calculate the total compressive force and total tensile force resisted by the singly reinforced rectangular beam.
- 3.4 Calculate the depth of neutral axis from the equilibrium condition
- 3.5 Define lever arm
- 3.6 write the equation for lever arm for a singly reinforced rectangular beam.
- 3.7 Explain - why the over reinforced sections are not recommended?
- 3.8 Calculate the maximum depth of neutral axis.
- 3.9 Calculate the limiting value of moment of resistance with respect to concrete and steel
- 3.10 Calculate the limiting percentage of steel.
- 3.11 Know the general design requirements for beams in limit state design as per IS 456 – 2000
(Effective span, limiting stiffness, minimum tension reinforcement, maximum tension reinforcement, maximum compression reinforcement, spacing of main bars, Cover to reinforcement, side face reinforcement.)
- 3.12 Calculate the depth of neutral axis for a given section and decide whether the section is balanced or under reinforced or over reinforced and calculate the moment of resistance for the respective case.
- 3.13 Calculate the area of steel for a given beam with given cross section and loading.

- 3.14 Design a singly reinforced beam as per IS 456 – 2000 for flexure only with the given grade of steel and concrete and check the designed beam for deflection as per IS 456 – 2000.
- 3.15 Explain the effect of shear on beam.
- 3.16 Explain the shear stress distribution across a homogeneous section and reinforced concrete section with sketches..
- 3.17 Explain the design shear strength and maximum shear stress in different grades of concrete as per IS 456 – 2000.
- 3.18 Explain the need for shear reinforcement and different forms of shear reinforcement provided in beams.
- 3.19 Explain the critical section for shear.
- 3.20 Calculate the shear strength of concrete, shear resistance of vertical stirrups, shear resistance of bent up bars as per IS 456 – 2000.
- 3.21 State the minimum shear reinforcement and maximum spacing of shear reinforcement as per IS 456 – 2000.
- 3.22 Calculate the nominal shear stress, shear resisted by bent up bars and spacing of vertical stirrups.
- 3.23 Design the shear reinforcement for beams.
- 3.24 Design a singly reinforced beam as per IS 456 – 2000 with the given grade of steel and concrete and check the designed beam for shear and deflection as per IS 456 – 2000 and design the shear reinforcement as per 456 – 2000.
- 3.25 State the situations which require doubly reinforced beams.
- 3.26 Determine the moment of resistance for a given doubly reinforced section (given d'/d – fsc values)
- 3.27 Design a doubly reinforced beam with the given data.
- 3.28 Calculate the allowable working load on singly reinforced beam for the given span. and doubly reinforced beam for the given span.
- 3.29 Calculate the allowable working load on doubly reinforced beam for the given span.
- 3.30 Calculate the development length of bars in compression, tension, and the curtailment position for main tension bars.
- 3.31 State the importance of anchorage values of reinforcement.
- 3.32 Design a singly / doubly reinforced simply supported rectangular beams for the given grades of materials, span and loading, for flexure including shear design with the curtailment of reinforcements and check for the deflection using simplified approach of the code.
- 3.33 Design a independent lintel subjected to triangular loading.

4.0 Understand the principles involved in the design of R.C.C slabs by Limit state method.

- 4.1 Distinguish one-way slabs and two way slabs.
- 4.2 List the types of slabs based on support condition.
- 4.3 Explain the general design requirements of slabs as per IS 456 – 2000.
- 4.4 Explain the functions of distribution steel in slabs.
- 4.5 Sketch the general reinforcement details for a 1) one way slab simply supported on two parallel sides and 2) one way slab simply supported on four sides. 3) two way simply supported slab 4) one way continuous slab, 5) cantilever slab continuous over a support and 6) slab cantilevering from the top of a beam.
- 4.6 Explain the edge strip and middle strip of a two way slab.
- 4.7 Sketch the general reinforcement details for a continuous two way slab for its edge strip and middle strip using straight bars and bent up bars.
- 4.8 Design one-way slab for given grades of materials, loads and span for flexure and including shear check, check for deflection using stiffness criteria.
- 4.9 Explain Load distribution in two-way slabs. Design two-way slab with different end conditions for flexure including shear using B.M and S.F coefficients. Provide torsional reinforcement in the restrained slabs. Check the deflection using simplified approach of stiffness criteria.
- 4.10 Classify the stairs based on the structural behavior or support condition.
- 4.11 Sketch the detailing of reinforcement in stairs spanning longitudinally (Dog legged staircase only)

5.0 Understand the principles involved in the analysis of T-beams

- 5.1 Distinguish a T- beam and a L- beam.
- 5.2 List the advantages of a T- beam.
- 5.3 Write formula for effective width of flange of a T- beam and L- beam as per IS 456 – 2000.
- 5.4 Calculate the effective width of flange of an isolated T- beam as per IS 456 – 2000.
- 5.5 Describe the three cases of determining Neutral axis of T-beams with sketches and notations.
- 5.6 Calculate the depth of neutral axis and moment of resistance of the given Tee section using the expressions given in the code.
- 5.7 State the minimum and maximum reinforcement in T- beams as per 456 – 2000.

6.0 Understand the principles involved in the design of Continuous beams and slabs

- 6.1 Explain the behavior of continuous beams and slabs subjected to loading.
- 6.2 List the advantages of continuous beams or slabs.
- 6.3 Draw the line diagram of a continuous beam or slab and indicate the bending moment and shear force values at salient points as per IS 456 – 2000.
- 6.4 Sketch the position of sagging (+ve) and hogging (-ve) bending moments along the continuous beam or slab.
- 6.5 Sketch the general reinforcement details for a continuous beam or slab.
- 6.6 Calculate the B.M and S.F of continuous beams and slabs (Minimum of three spans) at critical sections using B.M and S.F coefficients given in the code.
- 6.7 Design a continuous beam or slab as per code at a given section only.

7.0 Understand Analysis and Design of columns

- 7.1 Define a column/ compression member
- 7.2 Differentiate among
 1. Column,
 2. Strut,
 3. Pedestal and
 4. Post
- 7.3 Explain the need for providing reinforcement in column.
- 7.4 Explain the behavior of column under loading
- 7.5 Classify the columns based on type of reinforcement.
- 7.6 Classify the columns based on type of loading.
- 7.7 State the effective length of column for different end conditions as per theory and as per code.
- 7.8 Classify the columns based on slenderness ratio.
- 7.9 Define effective length of a column.
- 7.10 State the slenderness limits for column to avoid buckling of column.
- 7.11 State the minimum eccentricity of column.
- 7.12 Calculate the load carrying capacity of a short column with lateral ties and with helical reinforcement as per IS 456 – 2000.
- 7.13 Differentiate between short and long columns and understand their failure behavior.
- 7.14 Explain the design requirements of columns as per IS 456 – 2000.
- 7.15 Design a Short Square, rectangular, circular column with lateral ties

(subjected to axial load only).

8.0 Understand Design of Footings

- 8.1 Define Footing
- 8.2 State different types of Footings (Square/ Rectangular Isolated footings of Uniform/Tapered sections).
- 8.2 State the Rankine's formula for minimum depth of foundation.
- 8.3 State the code provisions for the design of R.C.C footings.
- 8.4 Explain the procedure of checking the footing for one-way shear, two-way shear, bearing stress and for development length.
- 8.5 Design isolated square footing of uniform thickness under a column for flexure only.

Note: Students may be encouraged to use design aid SP-16, SP-34 and SP-23 for design of slabs, beams for general practice. I.S.456 – 2000 is allowed in the Examination.

COURSE CONTENT

1.0 Introduction to R.C.C and Principles of working stress method

- 1.1 Introduction to R.C.C, advantages and disadvantages of R.C.C., Loads to be considered and Introduction to I.S Codes and Assumptions in working stress method.
- 1.2 Behavior of concrete and steel under working loads.
- 1.3 Modular ratio – critical percentage of steel.
- 1.4 Balance, under reinforced, over reinforced sections.
- 1.5 Critical and actual neutral axis depth of singly reinforced beams.
- 1.6 Moment of resistance of simply supported singly reinforced beam sections.
- 1.7 Design of singly reinforced rectangular beam for flexure.

2.0 Philosophy of limit state Design

- 2.1 Codes of practice of R.C.C design
- 2.2 Characteristic compressive strength, modulus of elasticity of concrete.
- 2.3 Nominal Mix – Design Mix – differences.
- 2.4 Loads to be adopted in R.C.C. design – dead load, Live load, wind load(as per IS 875-1987) and earth quake loads(as per IS-1893).
- 2.5 Strength and serviceability limit states, characteristic strength of materials and characteristic loads and partial safety factors.

2.6 Design strength of materials and design loads.

2.7 Assumptions made in the limit state design.

3.0 Analysis and design of Rectangular beams

- 3.1 Stress-strain diagram of singly reinforced RCC beam.
- 3.2 Depth of neutral axis, lever arm.
- 3.3 Moment of resistance of singly reinforced Rectangular section – balanced, under reinforced.
- 3.4 Critical percentage of steel.
- 3.5 Calculation of moment of resistance of the given section and design of singly reinforced rectangular beam for the given load as per IS 456-2000.
- 3.6 Doubly reinforced sections - necessity, use.
- 3.7 Calculation of neutral axis and moment of resistance for the given section and grades of concrete and steel (no derivation of the equations).
- 3.8 Shear in singly reinforced beams - nominal shears stress, permissible shear stress.
- 3.9 Methods of providing shear reinforcement in the form of vertical stirrups - combination of vertical stirrups and bent up bars.
- 3.10 Code provisions for spacing of stirrups and minimum shear reinforcement (no derivation of equations).
- 3.11 Development of bond stress in reinforcing bars.
- 3.12 Design bond stress - development length – bond and anchorage concepts and their importance.
- 3.13 Curtailment of tension reinforcement.
- 3.14 Simple problems on development length.
- 3.15 Design of simply supported singly and doubly reinforced rectangular beam for flexure including shear and check for deflection using stiffness criteria - Use of design aids (SP-16).
- 3.16 Design of an independent lintel subjected to triangular loading.

4.0 Design of slabs

- 4.1 Slabs as structural and functional members
- 4.2 One way and two way slabs
- 4.3 Minimum reinforcement and maximum spacing of reinforcement – concrete cover -stiffness criterion- stiffness ratios for simply supported, cantilever and continuous slabs.
- 4.4 One way and two way slabs with various end conditions as per I.S:456 code.

- 4.5 Design of one-way slab for flexure and shear for the given grades of concrete, steel, span and loading.
- 4.6 Check for deflection using simplified approach of stiffness criteria.
- 4.7 Design of two-way slabs with different end conditions, using B.M and S.F coefficients for the unrestrained and restrained conditions as per code.
- 4.8 Design of torsion reinforcement for the restrained slabs – Deflection check using stiffness criteria - Use of design aids (SP-16).
- 4.9 Detailing of reinforcement in stairs spanning longitudinally.
- 5.0 Design of T-beam**
- 5.1 Conditions needed for design of a beam as T-Section—advantages Code provisions for effective flange width - three cases of tee beams.
- 5.2 Neutral axis, lever arm and moment of resistance for under reinforced, balanced sections using the equations given in the code (no derivations).
- 5.3 Calculation of the moment of resistance of tee section using the equations given in the code – Use of design aids(SP16).
- 6.0 Design of Continuous beams and Slabs**
- 6.1 Behavior of continuous members and advantages of continuous beams and slabs.
- 6.2 Determination of B.M and S.F of continuous beams and slabs of minimum three spans using BM & SF coefficients given in the code-Use of design aids(SP-16).
- 6.3 Design the tension and shear reinforcement at a given section only.
- 7.0 Design of columns**
- 7.1 Definition of column – Difference between Column and Pedestal.
- 7.2 Types of columns (Long and Short) - effective length for different end conditions.
- 7.3 Code provisions for design of columns- square, rectangular and circular columns with lateral ties
- 7.4 Determination of Load carrying capacity of short column- square, rectangular, circular, helically reinforced column subjected to axial load only.
- 7.5 Design of short square, rectangular and circular columns (with lateral ties only).
- 8.0 Design of Footings**
- 8.1 Footings - Need for footings
- 8.2 Footings under isolated columns – loads on footings
- 8.3 Code provisions for design of footings - size of footings for given bearing

- capacity
- 8.4 Procedure of checking the footing for one-way shear, two-way shear, bearing stress and for development length.
- 8.5 Design of an isolated square footing of uniform thickness under a column for flexure only.

REFERENCE BOOKS

1. I.S:456- 2000
2. I.S:875-1987
3. Limit state design of R.C.C structures' by Ashok K.Jain, Nem chand brothers, Roorkee.
4. 'Limit state Design of concrete structural elements', continuing Education module prepared by N.I.T.T.R Chennai and published by I.ST.E continuing education cell, university Visveswaraiah College of Engineering, (UVCE)Campus, Palare Road, Bangalore – 560001.
5. Structural Engineering(RCC) by S. Ramamrutham.
6. Structural Engineering (RCC) by Vazirani and Ratwani.
7. R.C.C Structural Engineering by Guru charan Singh.
8. Reinforced Concrete Structures by I.C.Syal and A.K.Goyal
9. Limit state design of reinforced concrete by P.C. Verghese
10. Concrete technology and practice by M.S Shetty
11. SP:34 - Handbook on concrete reinforcement and detailing.
12. Structural Design & Drawing by N. Krishna Raju (Universities press)
13. Reinforced Concrete Design by S, Unnikrishnan Pillai & Devdas Menon
14. Reinforced Concrete Design by S.N. Sinha (Tata Mc Graw Hill)

ENVIRONMENTAL ENGINEERING – I

Subject Title : **Environmental Engineering - I**
Subject Code : **C-502**
Periods/Week : **04**
Periods/Semester : **60**

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Type	Essay Type
1.	Environment and Ecology	04	03	01	-
2.	Water Supply Scheme	06	16	02	01
3.	Sources and Conveyance of Water	12	26	02	02
4.	Quality and Purification of Water	18	29	03	02
5.	Distribution System	20	36	02	03
	Total	60	110	10	08

OBJECTIVES

Upon completion of the subject the student shall be able to

1.0 Know about Environment and Ecology

- 1.1 Define Environment.
- 1.2 Define 1. Ecology and 2. Ecosystem.
- 1.3 Understand the various global environmental issues.
- 1.4 Define
 1. Acid rain,
 2. Green house effect,
 3. Global warming and
 4. Ozone layer depletion
- 1.5 List the causes and effects of
 1. Acid rain,
 2. Green house effect,
 3. Global warming and
 4. Ozone layer depletion
- 1.6 Differentiate renewable and non-renewable energy sources

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- 1.7 List examples for renewable and non-renewable energy sources.
- 1.8 List the components of Ecosystem.
- 1.9 Explain the flow of matter and energy in an ecosystem.
- 1.10 List the factors affecting the stability of an ecosystem.
- 1.11 Explain the concept of sustainable development.
- 2.0 Know the scheme of water supply.**
- 2.1 Explain the need for water supply schemes in the present day civil life.
- 2.2 Explain the connection between water supply engineering and public health.
- 2.3 State the need of protected water supply.
- 2.4 List the objectives of a protected water supply scheme.
- 2.5 Draw the flow chart of a typical water supply scheme of a town.
- 2.6 List the factors affecting per capita demand of a town/ city.
- 2.7 State the requirements of water for various purposes:
 1. Domestic purpose,
 2. Industrial use,
 3. Fire fighting
 4. Commercial and institutional needs and
 5. Public use.
- 2.8 Explain the variation in demand for water supply.
- 2.9 Estimate the quantity of water required by a metropolitan area.
- 2.10 State the per capita demand for a small town for various purposes with a population of 50000
- 2.11 State the need for forecasting population in the design of water supply scheme.
- 2.12 State different methods of forecasting of population
- 2.13 Work out simple problems on forecasting population by different methods.
- 3.0 Understand the different sources and conveyance of water.**
- 3.1 State the common sources of water for a water supply scheme
- 3.2 state different types of surface sources of water.
- 3.3 state different types of sub surface sources of water.
- 3.4 State the merits and demerits of surface and ground water sources for a water supply scheme of a town.
- 3.5 State the salient features of various surface sources.

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- 3.6 Define
1. Aquifer,
 2. Aquiclude and
 3. Ground water table.
- 3.7 Classify wells according to construction.
- 3.8 Define
1. Draw down,
 2. Critical depression of head,
 3. Circle of influence,
 4. Cone of depression,
 5. Confined aquifer,
 6. Unconfined aquifer and
 7. Specific yield.
- 3.9 Explain the procedure for determining yield of a well by pumping tests (Constant Pumping and Recuperation Tests)
- 3.10 Explain the following with sketches:
1. Infiltration galleries.
 2. Infiltration wells.
- 3.11 Describe the intakes for collection of water (reservoir intake, river intake, canal intake and lake intake) with sketches
- 3.12 Explain different methods of conveyance of water.
- 3.13 Explain as to why the raw water is carried from its source to city treatment plant through pressure conduits only.
- 3.14 List the merits of different types of pipes used for conveyance of water.
- 3.15 List the demerits of different types of pipes used for conveyance of water.
- 3.16 Explain different joints used for connecting pipes with sketches
- 3.17 Describe the standard method followed in laying and testing the water supply mains.
- 4.0 Understand the Quality as per IS code and methods of purification of water**
- 4.1 State different types of impurities present in water.
- 4.2 State the need for laboratory tests for testing water.
- 4.3 Explain the method of obtaining samples for testing.
- 4.4 Explain different tests for analyzing quality of water with their significance.

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- 4.5 Define
1. E-coli index and
 2. Most Probable Number (MPN).
- 4.6 Explain the significance of E-Coli in water analysis.
- 4.7 Explain the importance of chemical and bacteriological analysis of water used for domestic purpose.
- 4.8 State the various water borne diseases in India.
- 4.9 State the maximum acceptable limits of the following for the public drinking water:
1. Turbidity,
 2. Hardness,
 3. Nitrates and
 4. Fluorides
- 4.10 State the objectives of treatment of water.
- 4.11 Sketch the overall layout of a water treatment plant indicating the different stages.
- 4.12 List the points to be considered in the location and layout of treatment plant.
- 4.13 State the objects of
1. Aeration,
 2. Plain sedimentation,
 3. Sedimentation with coagulation,
 4. Filtration and
 5. Disinfection.
- 4.14 Explain the process of
1. Aeration,
 2. Plain sedimentation,
 3. Sedimentation with coagulation and
 4. Filtration
- 4.15 Describe different types of sedimentation tanks.
- 4.16 Describe the construction and operation of
1. Slow sand filters,
 2. Rapid sand filters and
 3. Pressure filters and compares them.

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- 4.17 Compare
1. Slow sand filters,
 2. Rapid sand filters and
 3. Pressure filters
- 4.18 List the type of filters suitable for
1. Public purpose,
 2. Industrial use and
 3. Swimming pools.
- 4.19 Define disinfection of water
- 4.20 Explain the need for disinfecting water
- 4.21 Explain the methods of disinfection of water.
- 4.22 Explain different forms and points of Chlorination.
- 4.23 List the substances responsible for causing colour, taste and odour in water.
- 4.24 Explain the temporary hardness and permanent hardness of water
- 4.25 Explain various methods of removal of hardness of water.

***NOTE:** no design of treatment units.

5.0 Understand the systems of distribution and Water supply arrangements in Buildings

- 5.1 State the requirements of good distribution system.
- 5.2 Classify distribution system.
- 5.3 Explain different systems of distribution with sketches
- 5.4 State different methods of water supply system.
- 5.5 Explain different methods of water supply system with their merits and demerits.
- 5.6 List the merits of water supply system
- 5.7 State the necessity for service reservoirs.
- 5.8 Draw sketches of rectangular overhead service reservoir showing all accessories.
- 5.9 Explain with sketches the different layouts in distribution system.
- 5.10 List the merits and demerits of layouts with their suitability for a given locality.
- 5.11 List various appurtenances used in a distribution system of water supply

- system to a town.
- 5.12 Explains with sketches the location and functioning of various appurtenances used in a distribution system of water supply.
- 5.13 Explain methods of detecting leakages.
- 5.14 Explain methods of rectification and prevention of leakages in water supply mains.
- 5.15 Define terminology used while making water supply arrangements in buildings.
- 5.16 State the principles in laying pipelines within the premises of a building.
- 5.17 Explain the general layout of water supply connections of buildings with mains and suggests a suitable interior water supply arrangements for single and multi-storied buildings as per I.S Code.
- 5.18 State the general precautions to be taken in plumbing work for buildings.
- 5.19 Describe the constructional details and uses of different fittings: ferrule, goose neck, stopcock.

COURSE CONTENT

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1. Environment and Ecology

- 1.1 Environment – Biosphere – Atmosphere – Acid rain, Green house effect , global warming – Ozone layer depletion.
- 1.2 Renewable and non-renewable energy sources with examples.
- 1.3 Ecology and Ecosystem – components of ecosystem – Flow of matter in an ecosystem (food pyramid) – Flow of energy in an ecosystem – Ecological balance and stability of an ecosystem – Sustainable development with examples.
2. Introduction to Water Supply Scheme and Quantity of water
- 2.1 General importance of water supply.
- 2.2 Development of Water supply.
- 2.3 Need for protected Water supply.
- 2.4 Flow chart of a typical water supply scheme.
- 2.5 Total quantity of water for a town, per capita demand and factors affecting demand.
- 2.6 Water requirements for domestic purposes, industrial use, fire fighting, commercial and institutional needs, public use.
- 2.7 Variation in demand - peak demand – seasonal, daily and hourly variation.

2.8 Forecasting population by arithmetical, geometrical and incremental increase methods-problems on above methods.

3. Sources and Conveyance of Water

3.1 Surface source- Lakes, streams, rivers and impounded reservoirs.

3.2 Underground sources-springs, wells, infiltration wells and galleries.

3.3 Yield from wells by constant pumping and recuperation tests. (No problems required)

3.4 Comparison of surface and subsurface sources.

3.5 Types of intakes:

(i) Reservoir intake;

(ii) River intake;

(iii) Canal intake.

(iv) Lake intake.

3.6 Conveyance of water-open channels, aqueduct pipes.

3.7 Pipe Materials - C.I Pipes, Steel Pipes, concrete pipes, A.C. Pipes, G.I. Pipes Plastic Pipes (PVC &HDPE), merits and demerits of each type.

3.8 Pipe joints - spigot and socket joint, flange joint, expansion joint for C.I. Pipe, joints for concrete and asbestos cement pipes.

3.9 Pipe Laying and testing-Leak detection-prevention-rectification.

4. Quality and Purification of water.

4.1 Impurities of water - need for laboratory test – sampling- grab and composite sampling.

4.2 Tests of water - physical, chemical and bacteriological tests – PH value of water.

4.3 Standard quality for domestic use and industrial purposes.

4.4 Flow diagram of different treatment units.

4.5 Aeration - methods of aeration.

4.6 Sedimentation - plain sedimentation and sedimentation with coagulation.

4.7 Filtration - Construction and operation of slow sand, rapidsand and pressure filters.

4.8 Disinfection of water - necessity and methods of chlorination , pre-chlorination, break point chlorination

4.9 Colour, taste and odour control

4.10 Hardness – Types of Hardness - Removal of hardness.

NOTE: No design of treatment units

5. Distribution system and water supply arrangements in a Building.

5.1 General requirements, systems of distribution - gravity system, combined system, direct pumping.

5.2 Methods of supply - Intermittent and continuous.

5.3 Storage - underground and overhead-service reservoirs - necessity and accessories.

5.4 Types of layout - dead end, grid, radial and ring system their merits and demerits and their suitability.

5.5 Location and functioning of:

(i) Sluice valves.

(ii) Check valves or reflux valves.

(iii) Air valves.

(iv) Drain valves or blow-off valves

(v) Scour valves.

(vi) Fire Hydrants.

(vii) Water meters.

5.6 Water supply arrangements in building:

Definition of terms; water main, service pipe, communication pipe, supply pipe, distribution pipe, air gap.

5.7 General lay out of water supply arrangement for single and multi-storeyed buildings as per I.S Code of practice-general principles and precautions in laying pipelines within the premises of a building.

5.8 Connections from water main to building with sketch.

5.9 Water supply fittings, their description and uses - stopcock, ferrule, goose neck etc.

REFERENCE BOOKS

- | | | |
|----|---------------------------------------|------------------|
| 1. | Environmental Engineering | – G.S. Birdie |
| 2. | Elements of Public Health engineering | – K.N. Duggal |
| 3. | Environmental Engineering | – Baljeet Kapoor |
| 4. | Public Health Engineering | – S.K. Hussain |
| 5. | Water supply and sanitary Engineering | – V.N. Vazirani. |
| 6. | Environmental Engineering | --N.N.Basak /TMH |
| 7. | Water Supply Engineering | - S.K. Garg |

QUANTITY SURVEYING II

Subject Title	:	Quantity Surveying - II
Subject Code	:	C-503
Periods / week	:	05
Periods / Semester	:	75

TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage of marks	Short Type	Essay Type
1.	Detailed estimate of RCC elements	08	13	01	01
2.	Estimation of quantity of steel in RCC elements	09	16	02	01
3.	Analysis of Rates and Abstract Estimates	22	29	03	02
4.	Detailed estimates of Roads and Culverts	18	26	02	02
5.	Detailed estimates of Irrigation and Public Health Engineering works.	18	26	02	02
Total:		75	110	10	08

OBJECTIVES

Upon completion of the SUBJECT the student shall be able to

1.0 Prepare the estimate for RCC Structural elements

- 1.1 Explain types of staircases
- Dog legged staircase
 - Open well staircase
- 1.2 Prepare detailed estimates of
- Dog legged staircase and
 - Open well staircase.

2.0 Prepare the estimates for steel reinforcement for different R.C.C elements

- 2.1 State different methods of estimation of steel required for R C C work involved in a building
- 2.2 Explain different methods of estimation of steel required for R C C work involved in a building
- 2.3 State covers for RCC items as per IS 456 : 2000
- 2.4 Distinguish between straight bars and cranked bars used in simply supported beams
- 2.5 Distinguish between main reinforcement and distribution reinforcement used in RCC slabs
- 2.6 Compute the quantity of steel reinforcement for different elements of R.C.C works in a building by preparing a bar bending schedule

3.0 Understand the Analysis of Rates and Abstract estimations

- 3.1 Define analysis of rates
- 3.2 Explain the purpose of analysis of rates
- 3.3 Explain the following in rate analysis:
- Standard data book
 - Standard schedule of rates
 - Standard data sheet
- 3.4 Explain cost of material at source
- 3.5 Explain cost of material at site
- 3.6 Explain the following terms:
- Blasting charges
 - Seinorage charges
 - Cess charges
 - Stacking charges
 - Water charges
 - Crushing charges
 - Lead charges
- 3.7 Compute rate of an item of work
- 3.8 Explain different types of labour wages as per latest SSR
- 3.9 Define lead statement
- 3.10 Prepare the format for Lead Statement
- 3.11 Prepare Lead Statement and data for different items of work

- 3.12 Prepare the unit rates for finished items of works using standard data and SSR
- 3.13 Tabulate the material requirement of mortars and concrete of different proportions
- 3.14 Prepare abstract estimate for the following buildings:
- Single bedroom building (1 BHK)
 - Two bedroom building with verandah (2 BHK)
 - Three bedroom building (3 BHK)
- 4.0 Prepare detailed estimates of roads and culverts**
- 4.1 Prepare a detailed estimate for different types of roads and culverts
- 4.2 State the items involved in the abstract estimates of roads and culverts
- 5.0 Prepare the detailed estimates of irrigation and public health engineering structures**
- 5.1 Prepare a detailed estimate for the following items:
- Open well
 - R.C.C. overhead tank
 - Septic tank with soak pit / dispersion trench
 - Tank sluice with tower head
- 5.2 State the items to be included in the abstract estimates of above structures

COURSE CONTENT

- 1.0 Detailed estimate of RCC elements:**
R C C Doglegged – Open well stairs
- 2.0 Estimation of quantities of steel in R C C elements:**
- Simply supported singly reinforced R C C beams / Lintel
 - Simply supported one- way slab
 - R C C column with square footing
 - Preparation of Bar bending schedule for above
- 3.0 Analysis of Rates and Abstract Estimates:**
- Cost of materials at source and at site
 - Standard Schedule of Rates of different materials in buildings works
 - Types of labour – Wages as per S S R
 - Lead and Lift – Preparation of Lead Statement

- Data Sheets – Standard data for materials and labour components for different items of work
 - Preparation of unit rates for finished items of works using Standard data and S S R
 - Methods of calculating quantities of ingredients of various proportions of cement concrete.
 - Provisions for different building services and other over head charges
 - Prepare abstract estimate for:
 - Single bedroom building (1 BHK)
 - Two bedroom building with verandah (2 BHK)
 - Three bedroom building (3 BHK)
- 4.0 Detailed Estimates of Roads and Culverts:**
- Gravel Road
 - Water bound macadam road
 - Surface dressing with bitumen
 - Cement concrete road
 - Pipe culvert
 - R C C slab culvert with i) straight returns and ii) splayed wing walls
 - Different items in abstract estimate (Labour charges, Traffic diversion etc)

5.0 Detailed Estimates of Irrigation and Public Health Engineering works:

- Open well with masonry steining
- R C C over head tank
- Septic tank with soak pit / dispersion trench
- Tank sluice with tower head.
- Different items to be included in the abstract estimates of the above

REFERENCE BOOKS

- Estimating and Costing - B.N. Dutta
- Estimating and Costing - S. C. Rangawala
- Estimating Construction Costs - Robert L. Peurifoy & Garold D. Oberlender

IRRIGATION ENGINEERING

Subject Title	:	Irrigation Engineering
Subject Code	:	C-504
Periods/Week	:	05
Periods/Semester	:	75

TIME SCHEDULE

S. No	Major Topics	No. of Periods	Weightage of Marks	Short Type	Essay Type
1.	Nature and scope of Irrigation Engineering	5	13	01	01
2.	Elements of Hydrology	5	13	01	01
3.	Head works	15	23	01	02
4.	Gravity dams and Earth dams	15	23	01	02
5.	Distribution works	15	16	02	01
6.	Soil Erosion, Water logging and River Training works	10	10	--	01
7.	Water Management	5	06	02	--
8.	Watershed Management	5	06	02	--
	Total	75	110	10	08

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand the Nature and scope of Irrigation

- 1.1 Define Irrigation
- 1.2 Understand the necessity of irrigation.
- 1.3 List advantages of irrigation.
- 1.4 List disadvantages of irrigation
- 1.5 State different types of irrigation
- 1.6 Explain Perennial Irrigation
- 1.7 Explain Inundation Irrigation
- 1.8 Distinguish between
 1. Perennial and inundation irrigation,
 2. Flow and Lift irrigation, and
 3. Storage and Direct irrigation.
- 1.9 State Principal crops in India and their seasons
- 1.10 Explain Kharif crops
- 1.11 Explain Rabi Crops

- 1.12 Define the following terms:
 1. Duty,
 2. Delta,
 3. Base period and
 4. Crop period
 - 1.13 Explain different methods of expressing duty
 - 1.14 State the relationship between duty and delta.
 - 1.15 Explain the factors affecting duty
 - 1.16 State the requirement for precise statement of duty
 - 1.17 State the duty figures for principal crops
 - 1.18 Solve simple problems on duty
- 2.0 Understand the basic concepts of Hydrology**
- 2.1 Explain the term Precipitation
 - 2.2 State different types of rain gauges
 - 2.3 Describe Simon's rain gauge
 - 2.4 Explain the method of measurement of rainfall using Simon's Rain gauge
 - 2.5 Describe Float type automatic recording rain gauge
 - 2.6 Explain method of measurement of rainfall using float type automatic rain gauge
 - 2.7 Explain precautions in setting and maintenance of rain gauges
 - 2.8 State uses of rain fall records
 - 2.9 Describe Hydrological cycle
 - 2.10 Explain method of average annual rainfall of an area by Theisson's Polygon method
 - 2.11 Solve the problem on calculation of average annual rainfall by Theisson's Polygon method
 - 2.12 Define the following:
 1. Catchment,
 2. Intercepted catchment,
 3. Free catchment and
 4. Combined catchment area
 - 2.13 State the characteristics of
 1. Good catchment,
 2. Average catchment and

- 3 .Bad catchment
- 2.14 Explain the term Run-off
- 2.15 Explain factors affecting runoff
- 2.16 Understand nature of catchment and runoff coefficient
- 2.17 Explain methods of estimating runoff using empirical formulae
- 2.18 Solve the problems on estimating run-off
- 2.19 Understand the term maximum flood discharge
- 2.20 Explain the methods of determining maximum flood discharge from rain fall records
- 2.21 State Ryve's and Dicken's Formulae
- 2.22 Understand HFL marks and gauge reading
- 2.23 Solve simple problems on estimating maximum flood discharge
- 2.24 Explain River gauging
- 2.25 Explain the importance of river gauging
- 2.26 Lists the factors for selecting suitable site for a gauging station
- 3.0 Understand head works for a diversion scheme and protective works for resisting percolation**
- 3.1 Classify of head works
- 3.2 State the suitability of different types of head works under different conditions
- 3.3 State the factors for selecting suitable site for diversion head works
- 3.4 Describe the component parts of Diversion works with sketch
- 3.5 Describe with sketch the component parts of a weir
- 3.6 Distinguish between barrages and Weirs
- 3.7 Describe head regulator with sketch
- 3.8 Describe scouring sluice with sketch
- 3.9 Describe flood banks and other protective works
- 3.10 Define the following terms:
1. Percolation,
 2. Percolation gradient,
 3. Uplift and
 - 4.Scour.
- 3.11 Explain percolation gradient
- 3.12 Explain uplift pressure

- 3.13 Explain the effects of percolation on irrigation works
- 4.0 Understand basic ideas about reservoirs, gravity dams and Earth dams**
- 4.1 Distinguish between Rigid dams and Non-rigid dams
- 4.2 State factors influencing selection of site for reservoirs and dams.
- 4.3 Define the terms:
1. Full reservoir level,
 2. Maximum water level,
 3. Top bund level,
 4. Dead storage,
 5. Live storage,
 6. Free board,
 7. Gravity dam and
 8. Spillway.
- 4.4 Explain the causes of failure of gravity dams and their remedies.
- 4.5 Distinguish between low and high dams.
- 4.6 Draw the elementary profile of a gravity dam for a given height
- 4.7 Draw the practical profile of a low dam.
- 4.8 Explain uplift pressure
- 4.9 Explain need for drainage galleries with sketches
- 4.10 Explain construction and contraction joints with sketches
- 4.11 State need and types of grouting of foundations
- 4.12 Explain the method of grouting of foundations in gravity dams
- 4.13 State different types of spillways and their suitability and draw sketches
- 4.14 State the situations in which earth dams are suitable
- 4.15 State the three types of earth dams with sketches of typical cross sections
- 4.16 Explain causes of failure of earthen dams and their precautions
- 4.17 Explain the terms with sketches
- 1.Saturation gradient and
 2. Phreatic line
- 4.18 Explain drainage arrangements in earth dams with a neat sketch
- 4.19 State the method of constructing rolled fill earth dams and their maintenance.
- 4.20 Explain breach filling in earthen dams
- 4.21 Explain the maintenance of earth dams

- 5.0 Understand basic ideas about canals & cross masonry works**
- 5.1 Classify canals.
- 5.2 State the different methods of canal alignment and the situations in which each is suitable.
- 5.3 Sketch typical cross sections of canals
1. In cutting,
 2. Embankment and
 3. Partial cutting.
- 5.4 Explain balanced depth of cutting and its necessity
- 5.5 State the need for canal lining
- 5.6 State advantages of canal linings
- 5.7 State disadvantages of canal linings
- 5.8 Explain different types of canal linings
- 5.9 Explain the maintenance required for canals and their regulation
- 5.10 Explain Lacey's regime theory and Kennedy's silt theory(only explanation of formulae)(No problems)
- 5.11 Compare Lacey's and Kennedy's silt theories
- 5.12 State different types of cross masonry works (cross regulator, drainage & Communication) and their objectives.
- 5.13 State need for cross drainage works
- 5.14 Describe the following with sketches
1. Aqueduct,
 2. Super passage,
 3. Under tunnel, siphon,
 4. Level crossing and
 5. Inlet and outlet
- 6.0 Understand the soil erosion, water logging and River training works**
- 6.1 Explain terms:
1. Soil erosion,
 2. Reclamation, and
 3. Water logging.
- 6.2 State causes of soil erosion
- 6.3 State ill effects of soil erosion
- 6.4 Explain various methods of prevention of soil erosion.

- 6.5 State causes of water logging
- 6.6 State ill effects of water logging
- 6.7 Explain various methods of prevention of water logging
- 6.8 State methods of land reclamation.
- 6.9 State different stages of flow of rivers
- 6.10 Explain characteristics of Delta Rivers
- 6.11 Explain term meandering of river
- 6.12 State objectives of river training works
- 6.13 Explain various types of groynes and bell's bunds with sketches
- 7.0 Understand the principles of water management**
- 7.1 State soil-water plant relationship.
- 7.2 Describe the following irrigation methods:
1. Broader irrigation,
 2. Check basin irrigation,
 3. Furrow irrigation,
 4. Sprinkler irrigation and
 5. Drip irrigation
- 7.3 Explain on farm development
- 7.4 Describe 1. Warabandi system and 2. Water user associations
- 7.5 State the duties of water user associations
- 8.0 Understand the basic ideas about watershed management**
- 8.1 Explain the concept of
1. Water shed and
 2. Water shed management
- 8.2 State the need for watershed management
- 8.3 List the objectives of watershed management
- 8.4 State need for watershed development in India
- 8.5 Describe different approaches to water shed management
- 8.6 Explain water harvesting
- 8.7 Explain methods of 1. Rain water harvesting and 2. Catchment harvesting
- 8.8 Explain soil moisture conservation methods
- 8.9 Explain method water harvesting through check dams
- 8.10 Explain different methods of artificial recharge of ground water

- 8.11 Explain artificial recharges of ground water using percolation tanks

COURSE CONTENT

1. Nature and scope of Irrigation Engineering

- a) Definitions-necessity of irrigation-advantages and disadvantages-Perennial and Inundation irrigation-Flow and Lift irrigation-Direct and Storage irrigation.
- b) Principal crops-Kharif and Rabi crops-Dry and wet crops.
- c) Definition of duty, delta, base period, and crop period, Duty-different methods of expressing duty-base period-relationship between duty and delta- factors affecting duty – Requirements for precise statement of duty - Duty figures for principal crops-simple problems on duty.

2. Elements of Hydrology

- a) Precipitation – Types of rain gauges – Simon's rain gauge - Float type automatic recording gauge – precautions in setting and maintenance – rain fall records – Hydrological cycle-average annual rainfall of an area – Theissen's polygon method.
- b) Catchment basin in catchment area - Free catchment - combined catchment - Intercepted catchment – Run- off - Factors affecting run-off - Nature of catchment, run off coefficient - Methods of estimating run off Empirical formulae -
- c) Maximum flood discharge - Methods of determining maximum flood discharge from rainfall records, Ryve's and Dicken's formulae, H.F.L Marks, Gauge reading – Simple problems on M.F.D.
- d) River gauging – Importance – Site selection for river gauging

3. Head Works

- a) Classification of head works-storage and diversion, head works - their suitability under different conditions-suitable site for diversion works - general layout of diversion works-brief description of component parts of diversion works, brief description of component parts of a weir.
- b) Barrages and Weirs.
- c) Head Regulator-scouring sluice-flood banks and other protective works.
- d) Percolation-Percolation gradient-uplift pressures-effect of percolation on irrigation works.

4. Gravity dams and Earth dams

- a) Dams-rigid and non-rigid dams - main gravity dams-failures of gravity dams and remedial measures - elementary profile – limiting height of

dam-low dam and high dam - free board and top width – Practical profiles of low dam - uplift pressure - drainage gallery - Contraction joints - grouting of foundations - spillways

- b) Earth dams – situations suitable for Earth Dams types of earth dams-causes of failure of earth dams and precautions –saturation gradient and phreatic line-drainage arrangements-construction details of earth dams-breaching sections-breach filling-maintenance of earth dams.

5. Distribution works

- a) Canals-classification-different methods of canal alignment-typical cross section of canal in cutting embankment, partial cutting and embankment – Berms - standard dimensions - balancing depth of cutting-canal lining-necessity - types –maintenance of canals.
- b) Lacey's regime Silt Theory and Kennedy's Silt Theory(only explanation of formulae)- Comparison of two theories (No problems)
- c) Cross drainage works - Necessity – General description of aqueducts – Super passage – under tunnel - siphon level crossing- Inlet and outlet.

6. Soil erosion, Water logging and River Training works

- a) Soil erosion-methods of prevention of soil erosion-causes and effects-of water logging-preventing water logging methods-land reclamation.
- b) Different stages of flow of rivers-characteristics of Delta Rivers - Meandering - Object of river training - River training works- List out the various types of groynes and Bell's bunds.

7. Water management

Soil-water plant relationship-Irrigation methods-Broader Irrigation, check basin irrigation-Furrow Irrigation-Sprinkler irrigation-Drip irrigation – farm development, water user associations & Warabandi system.

8. Watershed Management

- a) Introduction - Concept of Watershed Management – Objectives of watershed Management – Need for watershed development in India – Integrated and multidisciplinary approach for water shed management.
- b) Water Harvesting: Rainwater harvesting, Catchment harvesting – Soil moisture conservation – Check dams – Artificial recharges and percolation tanks.

REFERENCE BOOKS

1. Irrigation Engineering by B.C Punmia
2. Irrigation Engineering and Water power Engineering by Birdie.
3. Irrigation Engineering by S.K.Garg
4. Irrigation Engineering by Basak-TMH

PROJECT MANAGEMENT FOR CONSTRUCTION

Subject Title	:	Project Management for Construction
Subject Code	:	C-505
Periods/ week	:	04
Periods/Semester	:	60

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Answer type	Essay Type
1.	Introduction	3	3	1	0
2.	Organizational Aspects	10	16	2	1
3.	Management Tools	15	26	2	2
4.	Contracts and Tenders and Arbitration	17	36	2	3
5.	Management of Resources in Construction	6	13	1	1
6.	Entrepreneurship	6	13	1	1
7.	Human Relations and Professional Ethics	3	3	1	0
	Total	60	110	10	08

OBJECTIVES

Upon completion of the subject the student shall be able to

1.0 Understand the importance of project management

- 1.1. Define Management.
- 1.2. State the functions of Management.
- 1.3. State the need for scientific Management of projects.
- 1.4. Describe the fields level management.
- 1.5. Describe the sequencing of work

2.0 Understand the importance of Organizational Aspects

- 2.1. Explain the organizational structure of any Engineering department (Government).
- 2.2. List the duties of different officers of an Engineering department.
- 2.3. Define
 1. Preliminary estimate,
 2. Detailed estimate,

3. Administrative approval and

4. Technical sanction.

- 2.4. State the limit of powers of sanction by various officers in an Engineering Department (Government).
- 2.5. Give the Organizational structure of a public sector construction company.
- 2.6. Compare the Head quarters versus Regional and Project Management.
- 2.7. List the duties of Chief Engineer in a construction company.
- 2.8. List the duties of a Resident Engineer.

3.0 Understand the importance of Organizational Aspects

- 3.1. Define 1. CPM and 2. PERT.
 - 3.2. State the advantages of CPM and PERT.
 - 3.3. Explain the use of bar chart and its limitations
 - 3.4. Define:
 1. Network,
 2. Activity,
 3. Event,
 4. Duration,
 5. Dummy activity,
 6. EST,
 7. EFT,
 8. LST,
 9. LFT,
 10. Total float,
 11. Free float and
 12. Critical path.
 - 3.5. Prepare network diagram using basic rules of network formation.
 - 3.6. Calculate time on CPM network identifying critical activities, critical path, free float and total float.
 - 3.7. State the limitations of CPM.
 - 3.8. Distinguish between CPM and PERT.
- #### **4.0 Understand different contract, Tendering systems and Arbitration**
- 4.1. Define contract
 - 4.2. State the contents of a contract document.

- 4.3. Explain different contract systems available for construction works.
- 4.4. List the merits and limitations of each of the contract systems.
- 4.5. List the general conditions of contract for a civil engineering- construction project.
- 4.6. Define tender.
- 4.7. Explain the need for calling of tenders.
- 4.8. List the steps involved in fixing up agency through tender system.
- 4.9. Draft a tender notice for a work
- 4.10. Prepare tender documents.
- 4.11. Explain the need of earnest money and security deposits.
- 4.12. Prepare a comparative statement.
- 4.13. Explain the method of selecting a contractor from the tenders.
- 4.14. List out the conditions of contract agreements.
- 4.15. Define 1. Dispute and 2. arbitration.
- 4.16. Explain the scope for disputes in a construction industry.
- 4.17. State the need for arbitration.
- 4.18. List the qualifications of an arbitrator.
- 4.19. List the advantages of arbitration.
- 5.0 Understand the principles of management of Resources like Materials, Plant and Equipments and Money**
- 5.1. Explain the scope of materials management.
- 5.2. Classify the common building materials based on the procurement.
- 5.3. Explain different Stages of materials management.
- 5.4. Explain the points to be observed in the storage of perishable and non-perishable store materials.
- 5.5. Explain the terms
1. Indent,
 2. Invoice and
 3. Bin card.
- 5.6. Explain the importance of verification of stores.
- 5.7. Explain the need for mechanization.
- 5.8. Explain the need for optimum utilization of plant and equipment.
- 5.9. Explain the financial impact of mechanization.
- 5.10. Explain about the preventive maintenance of plant and equipment.

- 5.11. Explain the importance of training of operators.
- 5.12. Explain the need for overhauling or replacement.
- 5.13. Explain the requirements of centering, shuttering and scaffolding
- 5.14. State the importance of finance as a resource.
- 5.15. State the purposes of cost control.
- 5.16. Explain the different stages at which cost control can be achieved.
- 5.17. Explain the financial control at head office level and site level.
- 6.0 Understand the role and characteristics of an entrepreneur**
- 6.1. Define
1. Entrepreneur and
 2. Entrepreneurship.
- 6.2. Outline the concepts of entrepreneurship.
- 6.3. State the role of entrepreneur in economic development.
- 6.4. List the characteristics of an entrepreneur.
- 6.5. Evaluate the risks and rewards of an entrepreneur.
- 6.6. State the role of financial institutions in entrepreneurial development.
- 7.0 Understand the role of Human relations and professional ethics in construction Industry**
- 7.1. State role of
1. Human relations and
 2. Performance in organization.
- 7.2. State the role of Interpersonal relationship for effective work culture.

COURSE CONTENT

1. Introduction

Definition and concept of management - need for scientific management of projects - need for attitudinal change - Scope and characteristics of construction Industry.

2. Organizational Aspects

Govt. organizations: Organizational structure of P.W.D. - duties of various officers - Preliminary estimates - detailed estimate - budget provision - administrative approval and technical sanction - powers of sanction.

Public sector organizations: Organizational structure of a construction

company - Head quarters versus Regional and Project Management-
Duties of Chief Engineer - preparation of bids - duties of Resident
Engineer.

3. Management Tools

Different Management Tools - Gantt Bar chart, modified Gantt bar chart -
Limitations of bar charts - Introduction CPM and PERT - advantages of
CPM and PERT - terms used in CPM - formation of network - Basic rules
- Problems on determination of critical path - limitations of CPM -
comparison of CPM and PERT.

4. Contracts, Tenders and Arbitration

Contracts - Legality of contracts - contract document - types of contracts -
piece work contracts - item rate contracts - Lump sum contracts -
percentage contracts - negotiated rates - departmental execution of works
- merits and limitations of each contract system - conditions of contract for
civil engineering works.

Tenders - Necessity of tenders - Sealed tenders - tender notice - tender
documents - Earnest Money and Security Deposits - Opening of tenders
- comparative statement - acceptance of tenders - work order - contract
agreement - conditions of contract.

Arbitration - Disputes - disputes in construction industry - arbitration -
need for arbitration - arbitrator - qualifications of arbitrator - advantages of
arbitration.

5. Management of Resources in Construction Industry

Materials management - Scope - Classification of common building
materials based on the procurement - procedural formalities for
acquisition - stages of materials management.

Plant and Equipment - Need for mechanization - Optimum utilization of
plant and equipment - Financial impact of mechanization - Preventive
maintenance -Overhauling and replacement - Centering, shuttering and
scaffolding requirements.

Financial Management - Finance as Resource - Purpose of cost control -
stages of cost control - pre contract stage and post contract stage -
Financial control at head office level and site level.

6. Entrepreneurship

Entrepreneur - concept, definition, role, expectation - characteristics of
entrepreneur - risk and rewards of an entrepreneur - role of financial
institution in entrepreneurial development.

7. Human Relations and Professional Ethics

Human relations and performance in organization - Understand self and

others for effective behavior - Interpersonal relationship for effective work
culture - Need for professional ethics.

REFERENCE BOOKS

1. Management in construction Industry - P.Dharwadker.
Oxford & IBH Publishing Co. Pvt., Ltd.,
2. Construction Management And Accounts -V.N.Vazirani & S.P. Chandola.
Khanna Publishers.
3. Construction Planning and Management . - U.K. Shrivastava
Galgotia Publications Pvt. Ltd., New Delhi.
4. Construction Management and Planning -B. Sengupta & H. Guna
Tata Mc. Graw Hill Publishing Company Ltd.
5. Construction Management and Accounts.- Harpal Singh.
Tata Mc. Graw Hill Publishing Company Ltd.

COMPUTER APPLICATIONS FOR PROJECT MANAGEMENT

Subject Title	:	COMPUTER APPLICATIONS FOR PROJECT MANAGEMENT
Subject Code	:	C - 506
Periods/Week	:	03
Periods/semester	:	45

TIME SCHEDULE

S.No.	Major Topics	No. of Periods
1.	Introduction to Project Management Software and Building Services softwares.	03
2.	Practice on Project Management software	12
3.	Practice on Software for Building Services	15
4.	Structural Design Drawings using STADD / SCADSS	15
	Total	45

OBJECTIVES

Upon completion of the subject the student shall be able to

1.0 Understand Project Management Software and Building Services soft wares

- 1.1 State the features of Project management software.
- 1.2 State the applications of Project management software.
- 1.3 State the features of Building services soft ware.

2.0 Practice Project Management software

- 2 Understand various menus available in MS-Project.
- 2.2 Understand input data.
- 2.3 Understand various commands to execute the given input data.
- 2.4 Prepare schedules for resource allocation.

- 2.5 Prepare networks for execution of projects.

3.0 Practice on Software for Building Services

- 3.1 Understand various menus available in 4M-IDEA-BIM software.
- 3.2 Prepare Layout of HVAC design for a given multistoried building plan using 4M-IDEA software.
- 3.3 Prepare Layout of water supply and sewerage design for a given multi storied building using 4M-IDEA software.
- 3.4 Prepare Layout of Electrical design for a given multistoried building plan using 4M-IDEA software.
- 3.5 Prepare Layout of Lift design for a given multistoried building plan using 4M-IDEA software.
- 3.6 Prepares layout of fire fighting design for a given multistoried building plan using 4M-IDEA software.

4.0 Prepare Structural and Irrigation Drawings using CAD

- 4.1 Prepare R.C.C Drawings
 - 4.1.1. Singly reinforced Rectangular beam
 - 4.1.2. T-beam
 - 4.1.3. Slab
 - 4.1.4. Column with Footing.
- 4.2 Prepare Structural Steel Drawings
 - 4.2.1 Built-up beams
 - 4.2.2. Beam-column connection
 - 4.2.3. Slab base and Gusseted base.
- 4.3 Prepare Irrigation Drawings
 - 4.3.1 Earthen Bunds
 - 4.3.2. Slab Culvert
 - 4.3.3. Pipe Culvert.

KEY Competencies to be achieved by the students

S. NO	Experiment Title	Competencies	Key Competency
1.	Introduction to Project Management Software and Building Services softwares.	<ul style="list-style-type: none"> • Learns the applications of Project management software. • Learns the applications of Building services soft ware 	<ul style="list-style-type: none"> • Learns the applications of Building services soft ware
2	Practice on Project Management software	<ul style="list-style-type: none"> • Learns various menus available in MS-Project • Learns inputting data • Learns various commands to execute the given input data • Prepares schedules for resource allocation • Prepares networks for execution of projects 	<ul style="list-style-type: none"> • Learns various commands to execute the given input data • Prepares schedules for resource allocation • Prepares networks for execution of projects
3	Practice on Software for Building Services	<ul style="list-style-type: none"> • Learns various menus available in 4M-IDEA-BIM software. • Prepares Layout of HVAC design for a given multistoried building plan using 4M-IDEA software. • Prepares Layout of water supply and sewerage design for a given multistoried building using 4M-IDEA software. • Prepares Layout of Electrical design for a given multistoried building plan using 4M-IDEA software. • Prepares Layout of Lift design for a given multistoried building plan using 4M-IDEA software • Prepares Layout of fire fighting design for a given multistoried building plan using 4M-IDEA software 	<ul style="list-style-type: none"> • Prepares Layout of HVAC design for a given multistoried building plan using 4M-IDEA software. • Prepares Layout of water supply and sewerage design for a given multistoried building using 4M-IDEA software. • Prepares Layout of Electrical design for a given multistoried building plan using 4M-IDEA software. • Prepares Layout of Lift design for a given multistoried building plan using 4M-IDEA software • Prepares Layout of fire fighting design for a given multistoried building plan using 4M-IDEA software
4	Preparation of Structural and Irrigation Drawings using CAD	<ul style="list-style-type: none"> • Draws R.C.C • Draws Structural Steel Drawings • Draws Irrigation Drawings 	<ul style="list-style-type: none"> • Draws R.C.C • Draws Structural Steel Drawings • Draws Irrigation Drawings

COURSE CONTENT**1.0 Introduction to Project Management and Building Service soft wares.**

- Importance of Project Management software and Building Services Software.
- Available Project Management soft wares – MS-project, Primavera Project Planner.
- Features of MS-Project software.
- Available Building services soft wares – 4M IDEA BIM (Building Information Modelling) software.
- Features of 4M IDEA BIM (Building Information Modelling) software.

2.0 Practice on Project Management software.

- Study various Menus available in MS-Project.
- Identify various activities for a given project.
- Input data required for the given project.
- Prepare schedules using MS-Project for resources like men, material, machinery, money.
- Calculate duration of project and Critical Path
- Generate various reports for the supervision of the project.

3.0 Practice on Software for Building Services

- Components of Building information Model (BIM) like 4M software.
 - For Heat, Ventilation and Air conditioning design
 - For Water supply and sewage design
 - For Electrical design
 - For Design of lifts
 - For design of Fire fighting System
 - For Gas supply pipes design
- Prepare Layout of HVAC design for a given multistoried building plan.
- Prepare Layout of water supply and sewerage design for a given multistoried building plan.
- Prepare Layout of Electrical design for a given multistoried building plan.

- e) Prepare Layout of Lift design for a given multistoried building plan.
 f) Prepare Layout of fire fighting design for a given multistoried building plan.

4.0 Preparation of Structural and Irrigation Drawings using CAD

- a) R.C.C Drawings - Singly reinforced Rectangular beam – T-beam – Slab – Column with Footing.
 b) Structural Steel Drawings – Built-up beams – Beam-column connection – Slab base and Gusseted base.
 c) Irrigation Drawings – Earthen Bunds – Slab Culvert – Pipe Culvert.

CIVIL ENGINEERING DRAWING – II

Subject Title	:	Civil Engineering Drawing - II
Subject Code	:	C - 507
Periods/Week	:	06
Periods/semester	:	90

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Type	Essay Type
1.	Culverts	15	12	1	01 (25marks)
2.	Bridges	15	12	1	
3.	Public health engineering drawings	12	16	1	
4.	Irrigation drawings	48	20	2	01 (15marks)
Total		90	60	05	02

Note: All questions are to be answered. Part-A 5X4=20 marks & part-B 25+15=40 marks

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OBJECTIVES

Upon completion of the subject the student shall be able to

1.0 Draw different views of culverts

1.1 Draw the plan, cross sectional elevation and longitudinal sectional elevation of

1. Pipe culvert,
2. R.C.C slab culvert and

1.2 Identify the component parts of the pipe culvert and R C C slab culvert from the given set of specifications.

2.0. Draw different views of T. Beam bridge

2.1 Label the component parts of a given R.C.C. T-beam bridge.

2.2 Draw the sectional elevation, plan and cross section of Two span R.C.C T-beam bridge from the set of given specifications.

3.0 Draw the component parts of Public health Engineering works

3.1 Draw the sectional elevation, plan and cross section of public health Engineering works.

4.0 Draw the different views of irrigation Engineering structure

- 4.1 Draw the sectional elevation, plan and cross section of different Irrigation engineering structures.

COURSE CONTENT**1. Simple Culvert**

Draw the plan, cross-sectional elevation and longitudinal sectional elevation of

1. Pipe culvert (Single Pipe)
2. R.C.C slab culvert with square returns.
3. R.C.C slab culvert with splayed wings

2. Bridges

1. Two-Span R.C.C T-beam bridge with square return walls.
2. Two-Span R.C.C T-beam bridge with splayed wing walls and Return walls.
3. Details of bearings used in steel bridges, R.C.C. bridges and P.S.C. bridges (sketches not to scale).

3. Public health engineering drawings

1. Septic tank with details of connection to a dispersion trench/soak pit
2. R.C.C overhead rectangular tank.(four columns with accessories).

4. Irrigation engineering drawings

1. Earthen bunds - Three types.
 - a) Homogeneous type b) Zoned embankment type c) Diaphragm type
2. Tank surplus weir with splayed wing walls.
3. Canal drop (notch type)
4. Head sluice (Head wall type)
5. Tank sluice with tower head.
6. Canal regulator

REFERENCE BOOKS

1. Civil Engineering Drawing-II by A. Kamala.
2. Civil Engineering Drawing-II by Chakraborty

LIFE SKILLS**(Common to all Branches)**

Subject Title	:	Life skills
Subject Code	:	C- 508
Periods per week	:	03
Period per semester	:	45

TIME SCHEDULE

Sl No.	Major Topics	No. of periods
1.	Concept of life skills	03
2.	Enhancing self esteem	03
3.	Goal setting	03
4.	Positive attitude	03
5.	Managing emotions	06
6.	Stress management	06
7.	Time management	03
8.	Interpersonal skills	03
9.	Creativity	03
10.	Problem solving and Decision making skills	03
11.	Assertiveness	06
12.	Leadership skills & Team spirit	03
TOTAL		45

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Note: No Written Examination

The students may be asked to demonstrate 1 or 2 skills from unit 2 to unit 12.

Marks: Internal – 40; External - 60

OBJECTIVES

On the completion of the course the students shall be able to

1.0 Understand the concept of Life Skills

- 1.1 Define Life Skills
- 1.2 Explain need and impact of Life Skills Programme
- 1.3 List the elements of Life Skills
- 1.4 Identify the sources of Life Skills

2.0 Understand the concept of Self esteem

- 2.1 Define the term self esteem
- 2.2 Explain the concept of Self esteem
- 2.3 List the characteristics of High Self esteem
- 2.4 List the characteristics of Low Self esteem
- 2.5 Explain the advantages of High Self esteem
- 2.6 Explain the behaviour patterns of Low self esteem
- 2.7 Explain the causes of Low self esteem
- 2.8 List the steps to build a positive Self esteem

Practicals

Exp No	Exercise	Activity (Questionnaire / Game and Role play)
1.	Identifying the Behaviour	<ul style="list-style-type: none"> • Identifying the behavior patterns of low self-esteem people.
2.	Practice Positive Self Esteem	<ul style="list-style-type: none"> • Steps to build a positive self esteem

3.0 Understand the concept of Goal setting

- 3.1 Define the term Goal
- 3.2 Explain the significance of Goal setting
- 3.3 Explain the following concepts
 - a) Wish b) Dream c) Goal
- 3.4 Explain the reasons for not setting goals
- 3.5 Explain effective goal setting process
- 3.6 List the barriers to reach goals

Practicals

Exp No	Exercise	Activity
1.	Differentiate among Wish, Dream and Goal	<ul style="list-style-type: none"> • Draw a picture of Your Self/ Your Country/ Your Society after 10yrs. • Discussion: Setting Personal Goals • Story Telling • Identifying of barriers • Analysis barriers • Overcoming barriers

4.0 Practise positive attitude

- 4.1 Define Attitude
- 4.2 Explain the concept of positive attitude
- 4.3 Explain the concept of negative attitude
- 4.4 Explain the effects of negative attitude
- 4.5 Identify the attitude of self and peers
- 4.6 Explain the effect of peers on self and vice-versa.
- 4.7 List the steps to enhance positive attitude
- 4.8 Explain the strategies to enhance positive attitude

Practicals

Exp No	Exercise	Activity (Psychological Instrument/ Game & Role play)
1.	Identify Positive attitude	<ul style="list-style-type: none"> • To study & to identify the attitude of self and peer • List & practise the strategies to enhance positive attitude.
2.	Observe	<ul style="list-style-type: none"> • Positive attitudes of self and Peers • Negative attitudes of self and Peers
3.	Practice Strategies to enhance Positive attitude	<ul style="list-style-type: none"> • Celebrating success • Listing successes

5.0 Practise managing emotions

- 5.1 Explain the concept of emotion
- 5.2 List the different types of emotions
- 5.3 Differentiate between positive and negative emotions
- 5.4 Identify the type of emotion
- 5.5 Explain the causes of different types of emotions.

- 5.6 Implement methods to manage major emotions (anger / depression)
- 5.7 Define Emotional Intelligence.
- 5.8 Explain the method to enhance Emotional Intelligence.

Practicals

Exp No	Exercise	Activity (Story / simulated situational act /GD & Role play)
1.	Identify the Type of Emotion	<ul style="list-style-type: none"> To identify the type and to study the cause of the emotion.
2	Managing Emotions	<ul style="list-style-type: none"> Managing major emotions -Anger and Depression

6.0 Practise stress management skills

- 6.1 Define Stress
- 6.2 Explain the concept of stress
- 6.3 List the types of stress
- 6.4 Explain the causes of stress
- 6.5 Comprehend the reactions to stress
- a) Physical b) Cognitive c) Emotional d) Behavioural
- 6.6 Explain the steps involved in coping with stress by
- a) Relaxation b) Meditation c) Yoga
- 6.7 Practice stress relaxing techniques by 3 methods.
- a) Relaxation b) Meditation c) Yoga
- 6.8 Comprehend changing personality and cognitive patterns.
- 6.9 Observe changing personality and cognitive patterns.

Practicals

Exp No	Exercise	Activity(Questionnaire /Interview and practice)
1	Identify the type of stress	<ul style="list-style-type: none"> To study & to identify the type and causes of stress.
2	Stress –Relaxation Techniques	<ul style="list-style-type: none"> Practice some simple Stress –Relaxation Techniques, Meditation, Yoga.

Practise some simple Stress –Relaxation Techniques, Meditation, Yoga.

7.0 Practice Time Management Skills

- 7.1 Define Time management.
- 7.2 Comprehend the significance of Time management.
- 7.3 Explain the strategies to set priorities.
- 7.4 List the steps to overcome barriers to effective Time management.
- 7.5 Identify various Time stealers.
- 7.6 Explain Time-Management skills.
- 7.7 List different Time-Management skills.
- 7.8 Comprehend the advantages of Time-Management skills.

Practicals

Exp No	Exercise	Activity (Group work and Games)
1	Identify Time stealers	<ul style="list-style-type: none"> Assign a activity to different Groups –Observe the time of accomplishing the task, Identify the time stealers.
2.	Practice Time-Management skills	<ul style="list-style-type: none"> Perform the given tasks- Games

8.0 Practise Interpersonal skills

- 8.1 Explain the significance of Interpersonal skills.
- 8.2 List the factors that prevent building and maintaining positive relationships.
- 8.3 Advantages of positive relationships.
- 8.4 Disadvantages of negative relationships

Practicals

Exp No	Exercise	Activity
1.	Identify Relationships	<ul style="list-style-type: none"> Positive Relationships, Negative Relationships – Factors that affect them- Through a story
2.	Practise Rapport building	<ul style="list-style-type: none"> Exercises on Rapport building Developing Correct Body Language

9.0 Understand Creativity skills

- 9.1 Define Creativity

- 9.2 List the synonyms like Invention, Innovation and Novelty
- 9.3 Distinguish between Creativity , Invention, Innovation, and Novelty
- 9.4 Discuss the factors that lead to creative thinking like observation and imitation , improvement etc.
- 9.5 Distinguish between Convergent Thinking and Divergent Thinking
- 9.6 Explain various steps involved in Scientific approach to creative thinking namely
 a) Idea generation b) Curiosity c) Imagination d) Elaboration e) Complexity
 f) Abstraction and simplification g) Divergent Thinking h) Fluency
 i) Flexibility j) Persistence k) Intrinsic Motivation l) Risk taking
 m) Projection/empathy n) Originality o) Story telling p) Flow.
- 9.7 List the Factors affecting the creativity in Individuals.
- 9.8 Give the concept of Vertical thinking and Lateral thinking.
- 9.9 Explain the importance of Lateral thinking.
- 9.10 Compare Lateral thinking and Vertical thinking

Practicals

Exp No	Exercise	Activity (Games and Group work)
1	Observe any given object	<ul style="list-style-type: none"> Identifying finer details in an object
2.	Imagine	<ul style="list-style-type: none"> Imagining a scene Modifying a story (introduce a twist) Improving a product Finding different uses for a product
3	Skills	<ul style="list-style-type: none"> Making paper craft
4	Product development	<ul style="list-style-type: none"> Brain storming session
5	Developing originality	<ul style="list-style-type: none"> Come up with original solutions for a given problem

10.0 Understand Problem Solving and Decision Making Skills

- 10.1 Define a Problem
- 10.2 Analyze the performance problems
- 10.3 Categorize the problems
- 10.4 List the barriers to the solutions to problems.

Practicals

Exp No	Exercise	Activity (Brainstorming – checklist technique free association, attribute listing)
1	Gathering the facts and Data and Organizing the information.	<ul style="list-style-type: none"> Information gathering and organizing Identifying the solutions to the problem Identifying the barriers to the solutions Zeroing on Optimum solution
2.	Problem solving	<ul style="list-style-type: none"> Games on Problem solving

11.0 Understand Assertive and Non Assertive behaviour

- 11.1 List the 3 types of Behaviours 1. Assertive 2. Non assertive (passive) 3. Aggressive Behaviour 4. Submissive behaviours
- 11.2 Discuss the personality of a person having above behaviours
- 11.3 Explain the usefulness of assertive behaviour in practical situations.
- 11.4 Explain the role of effective communication in reflecting assertive attitude
- 11.5 Give examples of Assertive statements a) Assertive request b) assertive NO
- 11.6 Explain the importance of goal setting
- 11.7 Explain the method of Conflict resolution.
- 11.8 Discuss the methods of controlling fear and coping with criticism.

Practicals

Exp No	Exercise	Activity (Simulated situational act)
1	Observation of behavior	<ul style="list-style-type: none"> Identifying different personality traits from the body language
2.	Practicing assertiveness	<ul style="list-style-type: none"> Write statements Reaction of individuals in a tricky situation Facing a Mock interview Detailing the characteristics of peers setting goals – Games like throwing a coin in a circle Giving a feedback on a)Successful program b) Failed project Self disclosure
3	Skills	<ul style="list-style-type: none"> Dealing with a critic Saying NO Dealing with an aggressive person
4	Simulation	<ul style="list-style-type: none"> Role play- skit 1. Assertive statements 2. goal setting 3. self disclosure

12.0 Practise Leadership Skills

- 12.1 Explain the concept of leadership
- 12.2 List the traits of an effective leader
- 12.3 Distinguish between Managing and leading
- 12.4 List the 3 leadership styles
- 12.5 Compare the above styles of leadership styles
- 12.6 Discuss choice of leadership style
- 12.7 Explain the strategies to develop effective leadership.
- 12.8 Explain the importance of Decision making
- 12.9 Explain the procedure for making effective decisions.

Practicals

Exp No	Exercise	Activity (Games and Group work)
1	Observation	<ul style="list-style-type: none"> Questionnaire
2.	Identification of a Leader	<ul style="list-style-type: none"> Give a task and observe the leader Discuss the qualities and his /her leadership style Ask the other members to identify the leadership qualities Reflection on the self
3	Skills	<ul style="list-style-type: none"> Decision making – followed by discussion
4	Building Team spirit	<ul style="list-style-type: none"> Motivation – Intrinsic and Extrinsic Training- Communication- Challenge

Competencies for Practical Exercises

S.No	Title	Competency	Key competencies
1.	Concept of life skills	<ul style="list-style-type: none"> Explain need and impact of Life skills 	
2.	Enhancing self esteem	<ul style="list-style-type: none"> Follow the steps to build a positive self esteem 	
3.	Goal setting	<ul style="list-style-type: none"> Practise the effective goal setting process 	
4.	Positive attitude	<ul style="list-style-type: none"> Practise the steps to enhance positive attitude. Observe the effects of peers on self and vice-versa. 	Practise the steps to enhance positive attitude
5.	Managing emotions	<ul style="list-style-type: none"> Practise the steps to manage emotional intelligence Identify different types of emotions Exercise control over Emotions 	<ul style="list-style-type: none"> Identify different types of emotions
6.	Stress management	<ul style="list-style-type: none"> Practise stress management techniques 	
7.	Time management	<ul style="list-style-type: none"> Practise Time management techniques 	
8.	Interpersonal skills	<ul style="list-style-type: none"> Identify positive and Negative Relations 	
9.	Creativity	<ul style="list-style-type: none"> Lead a small group for accomplishment of a given task. Build positive relationships. 	<ul style="list-style-type: none"> Build positive relationships.
10.	Problem solving and Decision making skills	<ul style="list-style-type: none"> Identify the various Problem solving and Decision making skills Make appropriate decision 	<ul style="list-style-type: none"> Identify the various Problem solving and Decision making skills
11.	Assertive and non Assertive behaviour	<ul style="list-style-type: none"> Practise Assertive and non Assertive behavior 	
12.	Leadership skills	<ul style="list-style-type: none"> Exhibit Leadership skills 	<ul style="list-style-type: none"> Exhibit Leadership skills

COURSE CONTENT**1.0 Concept of life skills**

Definition of life skills, Need and impact of life skills programme

2.0 Enhancing self esteem

Concept, Characteristics of high and low self esteem people, Advantages of high self esteem, Causes of low self esteem- Identification of behaviour patterns of low self esteem – Practice session of Questionnaire / Game -Steps to build positive self esteem – Practice session of Role play

3.0 Goal setting

Significance of goal setting, Concepts of Wish, Dream, and Goal Identify Wish, Dream, and Goal and differentiate among them. Reasons for not setting the goals, Barriers to reach goals, Identify Barriers, Effective goal setting process & Practise Effective goal setting

4.0 Positive attitude

concept effects of negative attitude, attitude of self and peers, effect of peers on self and vice-versa, steps to enhance positive attitude, strategies to enhance positive attitude

5.0 Managing emotions

Problem-definition, performance problems, Categorize the problems, barriers to the solutions to problems.

6.0 Stress management

concept of stress, Types of stress, causes of stress, reactions of stress, coping with stress, stress relaxing techniques, changing personality and cognitive patterns

7.0 Time management

Definition, significance of various Time stealers, Time management, strategies to set priorities, steps to overcome barriers, Time-Management skills- its advantages.

8.0 Interpersonal skills

Significance of Interpersonal skills, positive relationships- Advantages, negative relationships- Disadvantages

9.0 Creativity

Definition, Invention, Innovation, Novelty, Creative Thinking, observation and imitation, improvement, Expertise, skill, and motivation, components of Creativity, Convergent Thinking and Divergent

Thinking, various steps involved in Scientific approach to creative thinking namely, Factors affecting the creativity in Individuals, Vertical Thinking and Lateral Thinking.

10.0 Problem solving and Decision making skills

Definition, performance problems –analysis, categorizing, barriers to the solutions to problems.

11.0 Assertive and non Assertive behaviour

Types of Behaviours – their characteristics, need for controlling and avoiding aggressive behaviours, making and refusing an assertive request – their evaluation, importance of goal setting, method of giving feed back.

12.0 Leadership skills

Concept, importance, Role of a Leader in an Organization, Traits of an effective leader, Managing and leading, leadership styles-their comparison, theories of leadership, strategies to develop effective leadership, importance of Decision making, concept of ethical leadership and moral development.

REFERENCE

1. Robert Nlussier, Christopher F. Achua Leadership: Theory, Application, & Skill development: Theory, Application.

FIELD PRACTICES

Subject Title	:	Field Practices
Subject Code	:	C-509
Periods/Week	:	07
Periods/Semester	:	105

TIME SCHEDULE

S. No	Major Topics	No. of Periods
1.	Marking for the earth work of a pillar	07
2.	Marking for the earth work for the junction of two walls	07
3.	Marking the centre line of a one roomed building	07
4.	Marking for the earth work of a simple two roomed building	07
5.	Marking for the centre line of a one room in a residential building with reference to the given point using Total Station	07
6.	Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.	07
7.	Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.	07
8.	Supervisory skills of Plastering of a wall.	07
9.	Supervisory skills for construction of Cement Concrete Flooring.	07
10.	Supervisory skills of fixing of floor trap, gully trap and their connections to drain.	07
11.	Placement of reinforcement in an Isolated Column Footing with proper cover.	07
12.	Positioning of shuttering to the column reinforcement	07
13.	Placement of reinforcement for sun shade (with specific attention of location).	07
14.	Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).	07
15.	Placement of reinforcement for slab (with specific attention of chairs). OR Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).	07
	Total	105

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SKILLS

After completion of the subject, the student shall be able to

1.0 Marking for the earth work of a pillar

- 1.1 Note down the measurements of pillar at superstructure and measurements of earth work excavation.
- 1.2 Mark the centre lines of pillar in either direction.
- 1.3 Mark the size of pillar with reference to the centre lines.
- 1.4 Mark the size by pouring the lime.

2.0 Marking for the earth work of a junction of a wall

- 2.1 Read the width of walls at super structure from drawing.
- 2.2 Mark the centre line of main walls from the markings on burjis.
- 2.3 Mark the centre line of cross wall perpendicular to main wall with the help of wooden set square or by other means.
- 2.4 Transfer the same by pouring the lime on the centre line.

3.0 Marking the centre line of a one roomed building

- 3.1 Read the width of walls at super structure and width of earth work excavation from drawing.
- 3.2 Mark the centre line of main wall from the markings on burjis.
- 3.3 Mark the centre line of cross wall perpendicular to main wall with the help of wooden set square or by other means.
- 3.4 Mark the width of walls with reference to centre lines of walls.
- 3.5 Transfer the same by pouring the lime to proceed for excavation.
- 3.6 Mark the width of excavation with the help of threads placed parallel to the centre line and at a distance equal to half the width of excavation on either side of centre line.
- 3.7 Transfer the same by pouring lime to proceed for excavation.

4.0 Marking for the earth work of a simple two roomed building

- 4.1 Prepare the centre line diagram from a given drawing.
- 4.2 Note down width of earthwork excavation.
- 4.3 Mark the centre lines on the ground with the help of plumb bob.
- 4.4 Check the accuracy by measuring length of two diagonals and their equality.
- 4.5 Mark the width of excavation with the help of threads placed parallel to the

centre line and at a distance equal to half the width of excavation on either side of centre line.

- 4.6 Transfer the same by pouring lime to proceed for excavation.
- 5.0 Marking for the centre line of a one room in a residential building with reference to the given point using Total Station**
- 5.1 Place the total station at the point of known co-ordinates.
- 5.2 Perform temporary adjustments.
- 5.3 Key in the known co-ordinates of the point.
- 5.4 Place the target prism on the ground to locate the first corner point of known/calculated co-ordinate of centre line of the room.
- 5.5 Transfer the first corner point on to the ground.
- 5.6 Repeat the procedure to locate the second, third, fourth corner points of known co-ordinates and transfer the points on to the ground.
- 6.0 Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning**
- 6.1 Note the mix proportion and take the respective quantities of cement and sand (volume of 1 bag of cement = 0.035 cubic meter).
- 6.2 Place the measured quantity of sand to a suitable stack on an impervious hard surface.
- 6.3 Spread the cement uniformly over the sand stack.
- 6.4 Dry mix both sand and cement thoroughly to a uniform colour.
- 6.5 Sprinkle sufficient quantity of water on the dry mix while thoroughly mixing the dry mortar, which can be used for 30 minutes.
- 6.6 Continue the mixing to bring the mortar to a stiff paste of working consistency.
- 7.0 Construction of 230mm thick brick wall in English Bond at the corner of a wall and check for horizontality and verticality**
- 7.1 Soak the bricks in water and air dry before their use.
- 7.2 Prepare C.M of specified proportion and keep ready for use
- 7.3 Sketch the two threads perpendicular to each other at specified corner in line with the outer edges of wall.
- 7.4 Arrange the quoin header in line with the two perpendicular threads
- 7.5 Arrange the queen closure adjacent to quoin header.
- 7.6 Continue one layer with headers on one face and stretchers on the perpendicular face to the true line.
- 7.7 Continue the next layer with stretchers on headers and headers on

stretchers.

- 7.8 Check the verticality of the wall with the help of plumb bob and horizontality with the help of level tube for every three to four layers.
- 7.9 Place the bricks, with frog at the top.
- 7.10 Fill the vertical joint in each layer with mortar using trowel.
- 8.0 Supervisory skills of Plastering of a wall**
- 8.1 Prepare the surface by raking the joints and brushing the efflorescence if any by brushing and scraping dust and loose mortar.
- 8.2 Remove efflorescence if any by brushing and scraping.
- 8.3 Wash the surface thoroughly with water and keep the surface wet before commencement of plastering.
- 8.4 Complete the ceiling plaster before commencement of wall plaster
- 8.5 Fill all put log holes in advance of the plastering.
- 8.6 Start plastering from top and work down towards the floor.
- 8.7 Apply 15cm x 15cm plaster of specified thickness first, horizontally and vertically at not more than 2.0m intervals over the entire surface to serve as gauges.
- 8.8 Check the surfaces of gauges for truly in plane of the finished plaster surface by using a plumb bob.
- 8.9 Apply the mortar on the wall between the gauges with a trowel to a thickness slightly more than the specific thickness.
- 8.10 Use a wooden straight edge to bring to the true surface with small upward and sideways movement at a time reaching across the gauges.
- 8.11 Use trowel to obtain final finish surface as a smooth OR wooden float for sandy granular texture.
- 8.12 Avoid excessive use of trowel or over working the float.
- 9.0 Supervisory skills for construction of Cement Concrete Flooring**
- a. Base Concrete**
- 9.1 Use cement concrete of specified mix
- 9.2 Provide base concrete with the slopes towards floor trap required for the flooring using tube level.
- 9.3 Provide a slope ranging from 1:48 to 1:60 for flooring in varandah, courtyard, kitchen and bath.
- 9.4 Provide a slope of 1:30 for floors in water closet portion.
- 9.5 Provide necessary drop of 6mm to 10mm in flooring in bath, water closet and kitchen near floor traps to avoid spread of water.

b. Finishing

- 9.6 Follow the finishing of the surface immediately after the cessation of beating.
- 9.7 Allow the surface till moisture disappears from it.
- 9.8 Use of dry cement or cement mortar to absorb excessive moisture not permitted.
- 9.9 Spread the thick slurry of fresh cement and water @ 2kg of cement over an area of 1 square metre of flooring, while flooring concrete is still green.
- 9.10 The cement slurry shall be properly processed and finished smooth.
- 9.11 Finish the edge of sunk floor rounded with C.M 1:2 and finish with a floating coat of neat cement.
- 9.12 Cure the surface for a minimum period of 10 days.
- 9.13 Lay the flooring in lavatories and bath rooms only after fixing of water closets and squatting pans and floor traps.
- 9.14 Plug the traps while laying and open after curing and cleaning.
- 10.0 Supervisory skills of fixing of floor trap, gully trap and their connections to drain.**
- 10.1 Identify the Floor trap and Gully trap
- 10.2 Identify the location of fixing the floor trap and gully trap
- 10.3 Connect the floor trap to the drain pipe.
- 10.4 Fix the joint using proper filler and adhesive material such that the joint is water tight.
- 10.5 Fix gully trap on cement concrete foundation 65 mm x 65 mm and not less than 10 mm thick.
- 10.6 Prepare a mix of concrete 1:5:10 and jointing of gully outlet gully outlet to the branch drain is done
- 10.7 Tarred gasket soaked in thick cement slurry shall first be placed round the spigot of the drain
- 10.8 The remainder of the socket is filled with stiff mixture of cement mortar in the proportion of 1:1.
- 11.0 Placement of reinforcement for an Isolated Column Footing**
- 11.1 The grill of column footing should be kept ready as per design data.
- 11.2 Mark the centre lines in both directions on levelling course / bedding concrete with the help of plumb bob from the string stretched over the burjis.
- 11.3 Mark centre of the outer reinforcing rods of footing in either direction.

- 11.4 Carefully place the grill such that centre line markings of outermost reinforcing rods are exactly above the centre lines marked on the bedding concrete.
- 11.5 Place the chairs/cover blocks of specified thickness below the bottom layer of reinforcing rods.
- 11.6 Exercise care for rectangular column footing while placing reinforcing mat such that bars in longer direction are at bottom.
- 12.0 Positioning of shuttering to the column reinforcement**
- 12.1 Place the column reinforcement with chairs or cover blocks over the foundation mat.
- 12.2 Prepare the reinforcement as per the drawing.
- 12.3 Check for the verticality of column reinforcement with plumb bob
- 12.4 Provide lateral support for the column reinforcement to keep them in position.
- 12.5 Prepare the shuttering and apply waste oil inside surface of the shuttering box and fastenings
- 12.6 Place the shuttering box around the column and fix the fastenings.
- 12.7 Check for the verticality of shuttering with plumb bob
- 13.0 Placement of reinforcement for sun shade (with specific attention of location)**
- 13.1 Prepare the reinforcement as per design
- 13.2 Prepare the centering for sun shade
- 13.3 Place the grill for sun shade such that the main reinforcement is in the top zone leaving the cover
- 13.4 Place the cement mortar cover blocks or chairs of specified height below the main reinforcement to have prescribed cover above the reinforcement
- 13.5 Observe for sufficient length of anchorage of main reinforcement into the lintel or the beam etc.
- 14.0 Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs)**
- 14.1 Read the reinforcement details from the bar bending schedule
- 14.2 Prepare the shuttering for the stairs as per the design.
- 14.3 Bend the reinforcing bars to the shape and length confirming to the bar bending schedule.
- 14.4 Place the bars at the specified spacing maintaining the cover with the help of chairs or cover blocks.

- 14.5 Exercise care in the placement of reinforcement of at the junction of waist and loading slab.
- 14.6 Tie the distributors parallel to raisers at the specified spacing
- 15.0 Placement of reinforcement for slab (with specific attention of chairs)**
- 15.1 Prepare the reinforcement as per design
- 15.2 Rest the reinforcement in slabs on bar chairs
- 15.3 Securely fix to the bar chairs so that it won't move when concrete is placed around it.
- 15.4 Locate reinforcing bars and mesh so that there is enough room between the bars to place and compact the concrete.
- 15.5 Anchor the reinforcement to improve the transfer of tensile forces to the steel by bending or hooking or lapping the bars.
- 16.0 Placement of reinforcement for a beam column junction (with specific attention to Earth quake resistance design)**
- 16.1 Read the reinforcement details from the bar bending schedule
- 16.2 Note down proper cover-clear cover, nominal cover or effective cover to reinforcement.
- 16.3 Decide detailed location of opening/hole and supply adequate details for reinforcements around the openings..
- 16.4 Show enlarged details at corners, intersection of beams and column junction
- 16.5 Avoid congestion of bars at points where members intersect and make certain that all reinforcement is properly placed.
- 16.6 In the case of bundled bars, Make lapped splice of bundled bars by splicing one bar at a time
- 16.7 Stagger such individual splices within the bundle.
- 16.8 Make sure that hooked and bent up bars can be placed and have adequate concrete protection.

Key competencies to be achieved by the student

S.No	Experiment title	Key competency
1	Marking for the earth work of a pillar	Mark the size of pillar with reference to the centre lines
2	Marking for the earth work for the junction of two walls	Mark the centre line of main walls from the markings on burjis
3	Marking the centre line of a one roomed building	Mark the centre line of cross wall perpendicular to main wall
4	Marking for the earth work of a simple two roomed building	Check the accuracy by measuring length of two diagonals and their equality.
5	Marking for the centre line of a one room in a residential building with reference to the given point using Total Station	Transfer the first corner point on to the ground.
6	Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.	Dry mix both sand and cement thoroughly to a uniform colour
7	Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.	Arrange the quoin header in line with the two perpendicular threads
8	Supervisory skills of Plastering of a wall.	Complete the ceiling plaster before commencement of wall plaster
9	Supervisory skills for construction of Cement Concrete Flooring.	The cement slurry shall be properly processed and finished smooth
10	Supervisory skills of fixing of floor trap, gully trap and their connections to drain.	Fix the joint using proper filler and adhesive material such that the joint is water tight.
11	Placement of reinforcement in an Isolated Column Footing with proper cover.	Mark centre of the outer reinforcing rods of footing in either direction.
12	Positioning of shuttering to the column reinforcement	Place the shuttering box around the column and fix the fastenings
13	Placement of reinforcement for sun shade (with specific attention of location).	Place the grill for sun shade such that the main reinforcement is in the top zone leaving the cover
14	Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).	Exercise care in the placement of reinforcement of at the junction of waist and loading slab.
15	Placement of reinforcement for slab (with specific attention of chairs).	Locate reinforcing bars and mesh so that there is enough room between the bars to place and compact the concrete.
16	Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).	Decide detailed location of opening/hole and supply adequate details for reinforcements around the openings..

COURSE CONTENT

1. Marking for the earth work of a pillar.
2. Marking for the earth work for the junction of two walls.
3. Marking the centre line of a one roomed building
4. Marking for the earth work of a simple two roomed building.
5. Marking for the centre line of a one room in a residential building with reference to the given point using Total Station.
6. Preparation of cement mortar with specified mix proportion by manual mixing and volumetric proportioning.
7. Construction of 230mm thick brick wall in English Bond at the corner of a Wall and check for horizontality and verticality.
8. Supervisory skills of Plastering of a wall.
9. Supervisory skills for construction of Cement Concrete Flooring.
10. Supervisory skills of fixing of floor trap, gully trap and their connections to drain.
11. Placement of reinforcement in an Isolated Column Footing with proper cover.
12. Positioning of shuttering to the column reinforcement.
13. Placement of reinforcement for sun shade (with specific attention of location).
14. Placement of reinforcement for stairs spanning longitudinal case (with specific attention at the junction of waist and landing slabs).
15. Placement of reinforcement for slab (with specific attention of chairs).
16. Placement of reinforcement for a Beam column junction (with specific attention to Earth quake resistance design).

REFERENCE BOOKS

1. CPWD SPECIFICATIONS, Govt of India Vol I&II, 2009
2. Practical Civil engineering hand book – Kale and Shaw
3. Building Construction – Bindra & Arora
4. National Building Code- BIS publication

VI Semester

DIPLOMA IN CIVIL ENGINEERING
SCHEME OF INSTRUCTIONS AND EXAMINATIONS
VI Semester

TIME SCHEDULE

Subject Code	Name of the Subject	Instruction period / week		Total Period / year	Scheme of Examination			
		Theory	Practical		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
C-601	Design of Steel Structures	5	-	75	3	20	80	100
C-602	Environmental Engineering - II	4	-	60	3	20	80	100
C-603	Construction Technology & Valuation	5	-	75	3	20	80	100
C-604	Construction Failures, Repairs & Maintenance	5	-	75	3	20	80	100
C-605	Quality Control & Safety in Construction	4	-	60	3	20	80	100
PRACTICAL:								
C-606	Civil Engineering Workshop	-	3	45	3	40	60	100
C-607	Structural Engineering Drawing	-	6	90	3	40	60	100
C-608	Construction Technology Practice	-	3	45	3	40	60	100
C-609	Project Work	-	7	105	3	40	60	100
TOTAL		23	19	630		260	640	900

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- Note:**
1. Five local industrial visits / Interaction should be arranged during the semester period (One week).
 2. The students are supposed to submit the report on the significance of Field practices.
 3. Industries: construction sites, Steel plants, Sewage and sewerage treatment plants, Engineering material Laboratories, plumbing, Electrical and carpentry work shops

DESIGN OF STEEL STRUCTURES

Subject Title	:	Design of Steel Structures
Subject Code	:	C-601
Periods/Week	:	04
Periods/Semester	:	60

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Type	Essay Type
1.	Introduction and Fundamentals of Limit State Design of Steel structures	02	03	01	-
2.	Design of fillet welded joints	06	13	01	01
3.	Design of Tension members	09	16	02	01
4.	Design of Compression members, Columns & Column bases	20	36	02	03
5.	Design of Beams	15	26	02	02
6.	Design of Roof trusses	08	16	02	01
	Total	60	110	10	08

OBJECTIVES

Upon completion of the subject the student shall be able to

1.0 Know the Introduction and fundamentals of limit state design of steel structures

- 1.1 State common types of steel structures.
- 1.2 State the merits and demerits of Steel Structures.
- 1.3 State the demerits of Steel Structures
- 1.4 List the loads considered in the design of steel structures as per I.S:875-1987.
- 1.5 Describe various types of loads to be considered in the design of steel structures.
- 1.6 Understand the code of practice I.S. 800-2007
- 1.7 List physical properties of structural steel.
- 1.8 List mechanical properties of structural steel
- 1.9 Sketch different types of rolled steel sections
- 1.10 Classify cross sections of class 1 to 4

- 1.11 List types of elements.
- 1.12 Explain the Concept of Limit State Design.
- 1.13 Define 'limit state'.
- 1.14 State types of limit states.
- 1.15 Define the following terms:
 1. Characteristic action,
 2. Design action and
 3. Design strength.
- 1.16 State the partial safety factor values for loads in limit state of strength and serviceability.
- 1.17 State the partial safety factor values for materials in limit state.
- 1.18 State the deflection limits for
 1. Simply supported beam,
 2. Cantilever beam and
 3. Purlins

2.0 Understand the principles of design of Fillet Welded Joints

- 2.1 State different types of joints.
- 2.2 Differentiate the welded joints and Riveted joints
- 2.3 Sketch the different forms of welded joints.
- 2.4 Explain the features of a fillet welded joint.
- 2.5 State stresses in welds as per I.S.800-2007.
- 2.6 State formula for design strength of a fillet welded joint.
- 2.7 Calculate the design strength of a fillet welded joint.
- 2.8 Design a fillet welded joint for a given load, thickness of a plate and permissible stresses as per code.
- 2.9 Design a fillet welded joint for a single angle connected to the gusset plate by fillet welds along the sides and at ends carrying axial loads.
- 2.10 Design a fillet welded joint for a double angle connected to the gusset plate by fillet welds along the sides and at ends carrying axial loads.

3.0 Understand the principles of design of Tension Members

- 3.1 Define 'tie'
- 3.2 State the applications of tension members.
- 3.3 Sketch different forms of tension members.
- 3.4 Understand the behaviour of tension members.

- 3.5 State the different modes of failures
- 3.6 Describe different modes of failures of tension members with sketches
- 3.7 State the maximum values of effective slenderness ratios as per code.
- 3.8 Determine the net effective area of single angle connected to gusset plate by welding.
- 3.9 Determine the design strength due to yielding of gross section, rupture of critical section and block shear failure of a single angle connected by welding
- 3.10 Understand design procedure of tension members.
- 3.11 Design a single angle tension member connected by welding only.
- 4.0 Understand the principles of design of Compression Members, Columns and Column bases**
- 4.1 Understand the compression members
- 4.2 State different types of compression members (like column, strut)
- 4.3 Sketch different forms of compression members.
- 4.4 Understand the behaviour of compression members –
- 4.5 Classify cross sections.
- 4.6 Distinguish between actual length and effective length.
- 4.7 Define the terms 1. Least radius of gyration and 2. Slenderness ratio.
- 4.8 State effective lengths to be used for different end conditions.
- 4.9 Understand buckling class of cross section like 1. Imperfection factor and 2. Stress reduction factor for different buckling classes – column buckling curves.
- 4.10 State maximum values of effective slenderness ratios as per code
- 4.11 Understand the design compressive stress for different column buckling classes.
- 4.12 Determine the design strength of compression members
- 4.13 Understand design procedure of compression members.
- 4.14 Design columns with I sections and built up channel sections.
- 4.15 Understand design details - effective sectional area – codal provisions for angle struts.
- 4.16 Design single angle and double angle struts.
- 4.17 Understand codal provisions of single / double lacing and battening for built-up columns.
- 4.18 Design a slab base along with a cement concrete pedestal also design the welded connection.

5.0 Understand the principles of design of Steel Beams

- 5.1 Understand the concept of limit state design of beams
- 5.2 Define the terms:
1. Elastic moment of resistance,
 2. Plastic moment of resistance,
 3. Elastic section modulus and
 4. Shape factor.
- 5.3 Determine the shape factor values for rectangular, T, I section
- 5.4 Understand the behaviour of steel beams.
- 5.5 Classify beams based on lateral restraint of compression flange.
- 5.6 Determine the design strength in bending (flexure) and in shear.
- 5.7 List the factors affecting lateral stability – influence of type of loading.
- 5.8 Distinguish between web buckling and web crippling.
- 5.9 Understand the beams failure by flexural yielding – types.
- 5.10 List the types of beams failure by flexural yielding
- 5.11 Understand laterally supported beam – holes in tension zone – shear lag effects – design bending strength.
- 5.12 Understand laterally unsupported beam – lateral torsional buckling of beams (theoretical concept only – no problems).
- 5.13 Explain effective length of compression flanges.
- 5.14 Understand concept of shear in beams – resistance to shear buckling.
- 5.15 Understand shear buckling design methods like 1. Simple post critical method and 2. Tension field method.
- 5.16 Understand the design of simple beams with solid webs.
- 5.17 Understand component parts of plate girders with sketches
- 5.18 Describe different types of Stiffeners with their suitability.
- 5.19 Design laterally supported simply supported beam considering all codal requirements.
- 6.0 Understand the principles of design of Roof Trusses**
- 6.1 List types of trusses – 1. Plane trusses and 2. Space trusses.
- 6.2 Understand the situations where roof trusses are used.
- 6.3 Sketch different types of roof trusses with their suitability for a given span.
- 6.4 Sketch a roof truss and name the component parts.
- 6.5 Understand the configuration of trusses like 1. Pitched roof and 2. Parallel

- chord trapezoidal trusses.
- 6.6 Understand cross sections of truss members.
- 6.7 Understand the loads on roof trusses as per I.S – 875.
- 6.8 Explain the method of calculating the wind load on roof trusses..
- 6.9 Determine loads at nodal points of a given roof truss due to dead load, live load and wind load , given the coefficients K1, K2, K3 ,design wind speed, design wind pressure ,external and internal pressure coefficients.

COURSE CONTENT

1.0 Introduction and fundamentals of limit state design of steel structures

- 1.1 Merits and demerits of steel structures.
- 1.2 Loads considered in the design of steel structures as per I.S:875 -1987.
- 1.3 Introduction to I.S. 800-2007 - Mechanical properties of structural steel – yield stress (fy), ultimate tensile stress (fu) and maximum percent elongation (table -1 of IS:800-2007)
- 1.4 Standard structural sections – Classification of cross sections – class 1(plastic) class2(compact) class3(semi compact) and class4(slender) – types of elements –internal elements, outstands and tapered elements.
- 1.5 Concept of Limit State Design – limit state of strength – limit state of serviceability – classification of actions – strength – partial safety factors for loads and materials – deflection limits.

2.0 Design of Fillet Welded Joints

- 2.1 Different types of joints – lap joints – butt joints.
- 2.2 Differentiation of welded joints and riveted joints.
- 2.3 Different forms of welded joints – sketches of fillet and butt weld joints.
- 2.4 Fillet welded joint – detailed sketch showing the component parts.
- 2.5 Stresses in welds as per I.S.800-2007 – Codal requirements of welds and welding.
- 2.6 Problems on calculation of strength of a fillet welded joint.
- 2.7 Design of fillet welded joint for a given load, thickness of a plate and permissible stresses as per code.
- 2.8 Design of fillet welded joint for single or double angles carrying axial loads.

3.0 Design of Tension Members

- 3.1 Introduction to tension members and different forms of tension members.

- 3.2 Behaviour of tension members.
- 3.3 Different modes of failures – gross section yielding, net Section rupture and block shear failure.
- 3.4 Maximum values of effective slenderness ratios as per code.
- 3.5 Calculation of net effective sectional area of single angle with welded connection only.
- 3.6 Calculation of the design strength due to yielding of gross section, rupture of critical section and block shear – problems on single angle with welded connection only.
- 3.7 Design procedure of tension members.
- 3.8 Problems on design of tension members single angle with welded connection only.

4.0 Analysis and design of Compression Members, columns and column Bases

- 4.1 Introduction to compression members - different forms of compression members.
- 4.2 Behaviour of compression members – classification of cross sections - Classification of cross sections – class 1 (plastic) class2 (compact) class3 (semi compact) and class4 (slender).
- 4.3 Effective lengths to be used for different end conditions – table 11 of I.S:800.
- 4.4 Buckling class of cross section – imperfection factor and stress reduction factor for different buckling classes – column buckling curves.
- 4.5 Maximum values of effective slenderness ratios as per code – design compressive stress for different column buckling classes.
- 4.6 Calculation of design strength of compression members – problems.
- 4.7 Design procedure of compression members – problems on simple sections only (no builtup sections).
- 4.8 Design details - effective sectional area – codal provisions for angle struts – single angle and double angle – discontinuous and continuous struts.
- 4.9 Codal provisions of single / double lacing and battening for built-up columns (no problems).
- 4.10 Design of slab base along with a cement concrete pedestal, design of welded connection of base plate and column – problems.

5.0 Analysis and design of Steel Beams

- 5.1 Concept of limit state design of beams – shape factor and plastic properties of beams – Problems on shape factor.

- 5.2 Behaviour of steel beams – design strength in bending (flexure).
- 5.3 Factors affecting lateral stability – influence of type of loading-web buckling and web crippling.
- 5.4 Beams failure by flexural yielding – types.
- 5.5 Laterally supported beam – holes in tension zone – shear lag effects – design bending strength
- 5.6 Laterally unsupported beam – lateral tensional buckling of beams - (theoretical concept only – no problems).
- 5.7 Effective length of compression flanges.
- 5.8 Concept of shear in beams – resistance to shear buckling.
- 5.9 Shear buckling design methods - simple post critical method – tension field method.
- 5.10 Design of laterally supported simple beams with solid webs.
- 5.11 Component parts of plate girders with sketches – brief description of different types of stiffeners.
- 5.12 Design of laterally supported simply supported beam considering all codal requirements.
- 6.0 Design of Roof Trusses**
- 6.1 Types of trusses – plane trusses, space trusses.
- 6.2 Sketches of different roof trusses with their suitability for a given span.
- 6.3 Cross sections of truss members.
- 6.4 Loads on roof trusses as per I.S – 875.
- 6.5 Determination of loads at nodal points of a given roof truss due to dead load, live load and wind load, given the coefficients K_1 , K_2 , K_3 , design wind speed, design wind pressure, external and internal pressure coefficients.– problems.

REFERENCE BOOKS

- Code of practice: IS 800-2007
- Limit state Design of Steel Structures by S.K. Duggal/TMH
- Structural steel design by M.L.Gambhir/TMH
- Design of Steel Structures by N.Subramanian
- Design of Steel Structures by S.S.Bhavikatti
- Structural Engineering by A.P.ArulManickam
- Teaching Resource Material : <http://www.steel-insdag.org>
- Teaching Resource Material : <http://www.nptel.iitm.ac.in>

ENVIRONMENTAL ENGINEERING – II

Subject Title	:	Environmental Engineering - II
Subject Code	:	C-602
Periods/Week	:	04
Periods/Semester	:	60

TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Type	Essay Type
1	Introduction to Sanitary Engg & Quantity of Sewage	08	16	02	01
2	Laying of Sewers & Sewers appurtenances	08	19	03	01
3	Characteristics of Sewage, treatment & disposal	17	26	02	02
4	Solid waste disposal and Sanitation in buildings	12	23	01	02
5	Rural Water Supply and Sanitation	06	13	01	01
6	Air Pollution	05	13	01	01
	Total	60	110	10	08

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OBJECTIVES

Upon completion of the subject the student shall be able to

- 1.0 Understand the basics of sanitary engineering and Quantity of sewage**
- State the objectives of sewage disposal works.
 - Define the terms:
 - Sewage,
 - Sewer and
 - Sullage.
 - Explain the following:
 - Sewerage,
 - Refuse and
 - Garbage
 - List the objectives of sewerage works.
 - List the various methods of sewage collection works.
 - Compare conservancy system with water carriage system.

- 1.7 Explain the different sewerage systems.
- 1.8 Compare the systems of sewerage with each other.
- 1.9 Know which system of sewerage is preferable for towns with small and evenly distributed rainfall.
- 1.10 Understand which system of sewerage is used for a city like Hyderabad. Justify the choice.
- 1.11 State the main constituents of sewage for calculating quantity.
- 1.12 Define Dry weather flow.
- 1.13 State the factors affecting dry weather flow.
- 1.14 State the factors affecting the quantity of storm sewage.
- 1.15 Explain the variation in rate of sewage.
- 1.16 Estimate the quantity of storm water flow using 1. Rational method and 2. Empirical formulae.
- 1.17 List the requirements of good surface drains.
- 1.18 Describe different types of surface drains with their merits and demerits.
- 1.19 State the limiting velocities of flow in sewers.
- 1.20 Works out simple problems on design of sewers running half full only.
- 1.21 Explain the use of nomograms in detail in the design of sewers.
- 2.0 Understand the Types of sewers, laying of sewers and appurtenances**
- 2.1 State various shapes of sewers.
- 2.2 Explain the circular sewer with a sketch
- 2.3 List any two merits and demerits of circular sewer
- 2.4 Mention different materials used for sewers.
- 2.5 State any two merits and demerits for each type of sewer.
- 2.6 Explain the method of laying the sewers as per given alignment.
- 2.7 Know, why is it necessary to provide sewer appurtenances on the sewer lines.
- 2.8 List the various sewer appurtenances on a sewer line.
- 2.9 Explain the necessity of providing manhole in sewer line with the help of sketch.
- 2.10 Explain the construction, function and location of the different sewer appurtenances.
- 2.11 Know, why is it necessary to ventilate the sewers and how is it done.
- 2.12 State the situations under which sewage pumping is necessary.

- 2.13 Explain the component parts of a pumping station and factors influencing its location.
- 2.14 Explain the construction and working of Shone's ejector with the help of a sketch.
- 2.15 Know, how the testing of sewers is done.
- 2.16 Understand, why explosions occur in sewer lines and how they can be prevented.
- 3.0 Understand the characteristics of sewage**
- 3.1 Define strength of sewage.
- 3.2 Describe the method of sampling sewage.
- 3.3 State the physical, chemical and biological characteristics of sewage.
- 3.4 Define C.O.D and B.O.D
- 3.5 State the significance of the following tests to Analyse sewage.
i) Solids (ii) C.O.D. (iii) B.O.D. (iv) PH-Value (v) Chlorides.
- 3.6 State the characteristics of industrial waste water.
- 3.7 Explain the principles of treatment of industrial wastewater.
- 3.8 State the objects of sewage treatment.
- 3.9 Draw the conventional sewage treatment plant of a town and indicate the main function of each unit.
- 3.10 State the function of screens, skimming tanks and grit chambers.
- 3.11 Explain briefly the working of screens, grit chambers, skimming tanks.
- 3.12 Describes with sketch wherever necessary the following treatment works.
a) sedimentation tank.
b) Trickling filters.
c) Activated sludge process.
d) Oxidation ditch.
e) Oxidation pond.
f) Aerated lagoons.
g) Anaerobic lagoons.
h) Sludge digesters
- 3.13 Compare activated sludge process and trickling filters.
- 3.14 List out various methods of sludge disposal.
- 3.15 Explain the methods of sludge disposal.
- 3.16 Explain with sketch the treatment of sewage by septic tank and soak pit.

- 3.17 Determine the dimensions of a sedimentation tank and a septic tank for given data.
- 3.18 List the various methods of sewage disposal.
- 3.19 Explain the methods of disposal of sewage.
- 4.0 Know the methods of disposal of solid wastes and Sanitation in Building**
- 4.1 Define the term 'Refuse'
- 4.2 State the classification of solid wastes.
- 4.3 Explain the methods of disposal of solid wastes.
- 4.4 State any two merits and two demerits for each of the solid waste disposal methods.
- 4.5 Know, what is meant by composting.
- 4.6 Explain the methods of composting.
- 4.7 List the equipments required for preparation of compost by mechanical composting.
- 4.8 State the aims of building drainage .
- 4.9 State the requirements of good drainage system in buildings.
- 4.10 Know about the terms: soil pipe, waste pipe, vent pipe, anti- syphonage pipe.
- 4.11 Describe the layout of sanitary fittings and house drainage arrangements for buildings (single and multi-storied).
- 4.12 Explain with sketches the different types of plumbing systems.
- 4.13 Describe different sanitary fittings like water closets, flushing cisterns, urinals, inspection chambers, traps, anti-siphonage pipes.
- 4.14 Explain the procedures involved in the inspection, testing and maintenance of sanitary fittings.
- 5.0 Knows the methods of rural sanitation**
- 5.1 Explain the process of disinfection of wells by two pot method.
- 5.2 List the different types of sanitary latrines.
- 5.3 Explain the methods of rural sanitation.
- 5.4 Describe with sketches the construction of sanitary latrines in rural areas.
- 5.5 State the advantages of bio-gas plant.
- 5.6 State the factors on which the production of bio-gas depends.
- 5.7 Describe the construction and working of K.V.I.C.model bio-gas plant with a neat sketch.
- 5.8 Describe the construction and working of Janata model bio-gas plant

- with a sketch.
- 5.9 Know about vermi composting.
- 5.10 Describe briefly the procedure of vermi composting and mention its advantages.
- 6.0 Know the effects of air pollution and its control**
- 6.1 Define the term air pollution.
- 6.2 State the sources of air pollution.
- 6.3 Explain the natural and manmade sources of air pollution.
- 6.4 List the effects of air pollution.
- 6.5 Explain the effects of air pollution on human health and vegetation.
- 6.6 Explain the effects of air pollution on atmosphere and materials.
- 6.7 List the methods of control of air pollution.
- 6.8 Explain the method of prevention of air pollution at source.
- 6.9 List the various types of controlling devices and equipment.
- 6.10 Explain briefly with sketches the methods of controlling air pollution by controlling devices and equipment.
- 6.11 Describe briefly the control of air pollution by stacks.
- 6.12 Explain the method of prevention of air pollution by vegetation.

COURSE CONTENT

1. Introduction and Quantity of Sewage

- Object of providing sewerage works.
- Definition of terms : sullage, sewage, sewer and sewerage – classification of sewage.
- System of sewage disposal - conservancy and water carriage systems.
- Types of sewerage systems and their suitability – separate, combined and partially separate systems.
- Quantity of discharge in sewers, dry weather flow, variability of flow.
- Determination of storm water flow – run off co-efficient, time of concentration, rational method and empirical formulae for run-off.
- Surface drainage - requirements, shapes, laying and construction.
- Simple problems on design of sewers (running half full only) using Manning's and Hazen Williams formulae .

- i) Use of nomograms as per I.S.1742 to determine the unknown values of gradient, diameter, discharge and velocity.
- 2. Laying of Sewers and Sewer Appurtenances**
- a) Different shapes of cross section for sewers – circular and non-circular – merits and demerits of each.
- b) Brief description and choice of types of sewers - stone ware, cast iron, cement concrete sewers and A.C Pipes.
- c) Laying of sewers - setting out alignment of a sewer, excavation, checking the gradient , preparation of bedding, handling, lowering, laying and jointing, testing and back filling.
- d) Brief description, location, function and construction of
- Manholes.
 - Drop manholes.
 - Street inlets.
 - Catch basins.
 - Flushing tanks.
 - Regulators.
 - Inverted siphon.
- e) Necessity of pumping sewage - location and component parts of a pumping station.
- 3. Sewage Characteristics**
- a) Strength of sewage, sampling of sewage, characteristics of sewage; physical, chemical and biological.
- b) Analysis of sewage - significance of the following tests for (No details of tests)
- Solids, (ii) C.O.D, (iii) B.O.D., (iv) PH - Value, (v) Chlorides.
- c) Characteristics of Industrial waste water–principles of treatment, Reduction of volume and strength of wastewater, Equalization, Neutralization and proportioning.
- d) Preliminary treatment - Brief description and functions of following units.
- Screens, (ii) Skimming tanks and (iii) Grit chambers.
- e) Primary treatment - Brief description and functions of Plain sedimentation, simple problems on the design of sedimentation tanks.
- f) Secondary treatment - Brief description of
- Trickling filters (ii) Activated sludge process (iii) Oxidation ditch (iv) Oxidation pond (v) Aerated lagoons (vii) Anaerobic lagoons
- g) Sludge digestion – Process and methods of sludge disposal.

- h) Miscellaneous treatments-septic tank.
- Sewage disposal - dilution, disposal on to lands, ground water recharge, reuse etc.
- 4. Solid Waste Disposal and Sanitation in Buildings**
- a) Methods of disposal - uncontrolled dumping, tipping or sanitary land fill – Incineration - composting.
- b) Preparation of compost - equipments required such as storage hoppers, grinders conveyors etc., in mechanical composting.
- c) Aims of building drainage and its requirements – General layout of sanitaryfittings to a house - drainage arrangements for single and multi storeyed buildings as per IS code of practice-plumbing systems.
- d) Sanitary fittings – traps, water closets, flushing cisterns, urinals, inspection chambers, anti siphonage - Inspection, testing and maintenance of sanitary fittings.
- 5. Rural Water Supply and Sanitation**
- a) Disinfection of wells.
- b) Rural sanitation and sanitary latrines, biogas production technology - brief description and operational details of bio-gas plants using animal waste, night soil and agricultural wastes -KVIC and JANATA models- merits and demerits-maintenance of biogas plant.
- c) Vermi composting –procedure -advantages
- 6. Air Pollution**
- a) Definition - sources of air pollution – effects of air pollutions.
- b) Control of air pollution – methods - air pollution control at source – zoning – installation of controlling devices and equipment : internal separators, gravity settling chambers, cyclones, fabric filters, wet collection devices : cyclonic scrubbers, venture scrubbers, electrostatic precipitators - brief description of the above equipment – air pollution control by stacks – by vegetation.

REFERENCE BOOKS

- Environmental Engineering – G.S. Birdie
- Elements of Public Health engineering – K.N. Duggal
- Environmental Engineering – Baljeet Kapoor
- Public Health Engineering – S.K. Hussain
- Environmental Engineering – Ramachandraiah
- Water supply and sanitary Engineering – V.N. Vazirani.
- Environmental Engineering --N.N.Basak/TMH

CONSTRUCTION TECHNOLOGY AND VALUATION

Subject Title	:	Construction Technology and Valuation
Subject Code	:	C-603
Periods per Week	:	05
Periods per Semester	:	75

TIME SCHEDULE

S No	Major Topics	No. of Periods	Weightage of marks	Short Answer Type	Essay Type
1.	Concrete Technology	20	29	3	2
2.	Pre stressed Concrete	10	13	1	1
3.	Form Work and Reinforcement	08	13	1	1
4.	Construction Machinery and Equipment	08	13	1	1
5.	Building Services	09	13	1	1
6.	Earth quake resistant Structures	06	13	1	1
7.	Building Valuation	14	16	2	1
	Total	75	110	10	8

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand the concrete Technology

- 1.1 State the ingredients of Concrete.
- 1.2 Define 1. Workability and 2. Water/Cement ratio
- 1.3 Explain the relation between strength of concrete , workability and water/ cement ratio
- 1.4 Understand 'Grades' of concrete.
- 1.5 State the grades of concrete recommended for different types of works.

- 1.6 Differentiate 'Normal strength concrete and High strength concrete'
 - 1.7 Differentiate between 'Ordinary Concrete and Controlled Concrete'
 - 1.8 State the functions of Admixtures in concrete
 - 1.9 List out different admixtures being used.
 - 1.10 State the Principles of Concrete Mix Design.
 - 1.11 State the factors affecting variability of concrete strength.
 - 1.12 Explain the procedure of Concrete Mix design using IS Code method
 - 1.13 Understand the following special concretes
 1. Fiber Reinforced Concrete,
 2. Fal-G-Concrete,
 3. Light weight concrete,
 4. High density concrete,
 5. Polymer concrete and
 6. Self compacting concrete
 - 1.14 Understand concreting under special exposure conditions like
 1. Under- water concreting,
 2. Cold weather concreting,
 3. Hot weather concreting and
 4. Concreting in high rise buildings
 - 1.15 Explain 'Micro concrete' and 'Shotcrete'.
 - 1.16 State the need for Expansion and Construction joints in concrete structures.
 - 1.17 Explain the method of providing various joints in RCC roofs.
- 2.0 Understand the Pre stressed concrete**
- 2.1 Understand fundamental principles of prestressed concrete.
 - 2.2 State the materials and permissible stresses.
 - 2.3 List the losses of prestress.
 - 2.4 Explain the methods of 1. Pre stressing and 2. Post- tensioning systems.
- 3.0 Understand Form work and Reinforcement**
- 3.1 State the Objectives of Formwork.
 - 3.2 State the requirements of formwork.
 - 3.3 List the loads to be considered for the design of formwork.
 - 3.4 Draw the formwork arrangements for

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1. Slab and Beam system,
 2. Column and
 3. Wall
- 3.5 State the merits of Steel formwork over Timber formwork.
- 3.6 State the demerits of Steel formwork over Timber formwork.
- 3.7 State the chemical composition of structural steel as per IS.
- 3.8 State different types of steels used for concrete reinforcement along with their mechanical properties.
- 3.9 Explain the bond mechanism in plain and deformed bars.
- 4.0 Understand the Construction Machinery and Equipment**
- 4.1 Understand the need for mechanization and construction activities
- 4.2 State different types of construction equipment
- 4.3 Explain the uses of different construction equipment
- 4.4 State the factors to be considered for the selection of type of construction equipment.
- 5.0 Understand the Buildings services**
- 5.1 Explain the hot water supply distribution using solar water heating system.
- 5.2 State the requirements of good lighting in building.
- 5.3 Define the terms 1. Glare and 2. Day light factor
- 5.4 State the precautions to be taken to avoid glare in building
- 5.5 State the requirements of good electrical wiring.
- 5.6 List the power rating of different domestic electrical appliances.
- 5.7 List the different types of electrical wirings.
- 5.8 State the objectives of electrical earthing.
- 5.9 Explain the method of earthing
- 5.10 State the requirements of good ventilation.
- 5.11 Explain 1. Natural ventilation and 2. Artificial ventilation.
- 5.12 State the functions of
1. Sunshades,
 2. Louvers,
 3. Sun breakers and
 4. Blinds
- 5.13 State the principles of fire protection in buildings.

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- 5.14 State the causes of fire.
- 5.15 Explain about fire fighting.
- 5.16 State different fire detectors and fire extinguishers.
- 5.17 State different fire extinguishers
- 5.18 State different fire resistant building materials.
- 5.19 Explain about air conditioning.
- 5.20 State different types of cooling systems.
- 6.0 Understand Earth quake resistant structures.**
- 6.1 List causes seismic waves, basic terminology
- 6.2 Explain 1. Magnitude, 2. Intensity and 3. Energy release
- 6.3 Characteristics of earthquake
- 6.4 Understand basic terminology of Earthquake
- 6.5 Explain seismic zoning
- 6.6 Explain seismic construction with brick stone masonry buildings as per codal provisions.
- 6.7 Explain seismic construction with stone masonry buildings as per codal provisions.
- 6.8 Understand seismic construction and detailing of R.C. buildings as per codal provisions.
- 7.0 Understand the concept of Building Valuation**
- 7.1 Define the terms: 1. Value and 2. Cost and price
- 7.2 State the need for valuation.
- 7.3 Explain the following terms:
1. Depreciation,
 2. Sinking fund,
 3. Annuity and
 4. Capitalized value
- 7.4 Lists different methods of valuation of buildings.
- 7.5 Explains different methods of valuation of buildings.
- 7.6 State methods of rent fixation of building.
- 7.7 Explain methods of rent fixation of building.

COURSE CONTENT**1.0 Concrete Technology**

- a) Introduction – Ingredients of Concrete – Properties of Concrete – Workability-Factors influencing workability –Water/Cement Ratio-Relation between Strength of concrete and Water/Cement Ratio.
- b) Curing of Concrete-Method of curing.
- c) Grade of concrete-Controlled concrete and Ordinary concrete-Normal strength concrete and High strength concrete
- d) Admixtures – Types of admixtures –Accelerators-Retarders-Plasticizers –Super plasticizers- Uses.
- e) Mix design – Factors influencing mix design – Methods of Mix design – IS 10262-2009 method of mix design.
- f) Special Concretes – fiber reinforced Concrete – Fal G-Concrete, high density Concrete, Light weight Concrete, polymer Concrete and micro Concrete – Self Compacting Concrete-Properties – uses.
- g) Concreting under special exposure condition – cold weather Concreting – hot weather Concreting – under water concreting – Shortcrete – Concreting in high rise buildings.
- h) Joints – Necessity of joints – Joints in RCC roofs – Expansion joint – Contraction joint – Construction joint.

2.0 Prestressed Concrete

- a) Introduction – Basic principles – Systems of prestressing – Types of prestressing – Advantages and Disadvantages.
- b) Requirements of steel and concrete for prestressed concrete.
- c) Losses of Prestress.
- d) Tensioning devices – Method of Prestressing – Pretensioning system – Post tensioning systems – Freyssinet, Magnel-Blaton, Gifford Udal and LeeMcal Systems.

3.0 Form work and reinforcement

- a) Objectives of form work – Loads acting on form work – Component parts of ordinary form work for columns, beams and slabs.(with sketches)
- b) Types of formwork based on the material used –Wooden form work-Steel form work.
- c) Cleaning and treatment of forms – Stripping time – tolerances.
- d) Slip form work for towers and Form work for Lining of canals.

- e) Reinforcement – types – Properties as per IS.
- f) Bending, Fixing, Placing, Tying and Welding.

4.0 Construction machinery and equipment

- a) Need for use of construction Machinery.
- b) Factors affecting selection of equipment.
- c) Types – Crawler and Pneumatic tyred.
- d) Excavation equipments – Tractors, Bulldozer, Grader, Scrapper, Shovel, Dragline, Clamshell, Dredgers – description-Uses.
- e) Compaction equipments – Rollers, Tamping roller – Smooth wheeled roller – Pneumatic tyred rollers – Vibrating compactors – Description – uses.
- f) Hauling equipments – Trucks, Dump trucks, Dumpers.
- g) Cranes –Tower cranes.
- h) Conveying equipments – Belt conveyors.

5.0 Building Services

- a) Hot water supply using solar water heating system.
- b) Lighting requirements in a building – daylight factor – glare.
- c) Electrical services – Requirements of good electrical wiring – types of electrical wirings – earthing – methods.
- d) Ventilation – Requirement of good ventilation – Natural and Artificial ventilation – purpose of sunshades, louvers, and blinds.
- e) Air conditioning – Purpose – Air conditioning layout – Components – Types of cooling systems – Air coolers – Air conditioner – Centralized Air conditioner – Split type Air Conditioner.

6.0 Earth quake resistant structures

- a) Causes of seismic waves – Magnitude, intensity and energy release – basic terminology – Characteristics of earthquake – seismic zoning.
- b) Seismic construction of brick and stone masonry buildings – Provisions of I S : 4326.
- c) Seismic construction of R.C. Buildings – Detailing as per Provisions of I S : 13920.

7.0 Building Valuation

- a) Definition – Value, Cost and Price, Scrap value, Salvage value, Market value, Book value, Sinking fund and its meaning – purpose of valuation – factors governing valuation.
- b) Depreciation – Sinking fund – Annuity – Capitalized value.

- c) Methods of valuation – Land & building method, Development method, Depreciation method, Rental method, Capitalization method, Profit method, Simple problems on each of the above method.
- d) Rent fixation – Rent fixation of building – principles of rent fixation by CPWD – Fair rent method – simple problems.

REFERENCE BOOKS

1. Prestressed Concrete by N Krishna Raju, Mc Graw Hill, New Delhi.
2. Concrete Technology by M S Shetty
3. Building Technology and valuation TTTI, Chennai
4. Hand book on Design of Concrete mixes S.P.23
5. Valuation of Real Properties by S.C.Rangwala

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CONSTRUCTION FAILURES, REPAIRS AND MAINTENANCE

Subject Title : Construction failures, repairs and maintenance
Subject Code : C-604
Periods/ week : 05
Periods/year : 75

TIME SCHEDULE

Sl.No	Major Topics	Periods	Weightage of Marks	Short Answer Type	Essay Answer Type
1.	Introduction	02	03	1	--
2.	Subsurface construction failures and repairs	15	16	2	1
3.	Surface construction failures and repairs	08	13	1	1
4.	Masonry and concrete failures, repairs	15	26	2	2
5.	Manmade and Natural failures, rehabilitation	15	26	2	2
6.	Maintenance problems and their solutions	20	26	2	2
	Total	75	110	10	08

OBJECTIVES

Upon completion of the subject the student shall be able to

1.0 Introduction

1.1 Define

1. Error,
2. Defect and
3. Failure

1.2 State different types of errors causing failures.

1.3 State the causes of failures.

2.0 Understand subsurface construction failures and repairs

2.1 Describe construction failures in foundations – Under mining safe support – Load transfer failure – Lateral movement – Unequal support – settlement and differential settlement – Uplift in expansive soils – Design error – Construction error – flotation and water change – vibration effect – earthquake effect.

- 2.2 Describe the repairs involved for rectifying the above failure.
- 2.3 Describe Sub surface construction failures – Trenches, sheeting and bracing, piles and caissons – Sewer and tunnels, dams.
- 2.4 Describes the repairs involved for rectifying the above failures.
- 3.0 Understand Surface construction failures and repairs**
- 3.1 Briefly describes the following types of failures in surface construction – Slopes and slides – Subsidence, retaining walls and abutments.
- 3.2 Briefly describes the repairs involved for rectifying the above failures.
- 4.0 Understand Masonry and concrete failures, repairs**
- 4.1 Describe types of failures in masonry – Wall failure, construction error, aging, joints and cracks, weather tightness, masonry cladding, partitions, ornamental screens, plaster.
- 4.2 Explain the repairs involved for rectifying the above failures.
- 4.3 Explain the types of failures in concrete – Improper mix design, curing, placement of reinforcement, Rusting of embedded steel, handling of pre cast elements, shrinkage, expansion and plastic changes, surface disintegration due to fire, spalling of concrete, compression failure, erection difficulty, temperature change, Deformation and cracking – repairs.
- 4.4 Explain the repairs involved for rectifying the above failure- use of expansion filler.
- 5.0 Understand Manmade and natural failures and repairs**
- 5.1 Describe the following types of failures in manmade and natural disasters.
- 5.2 Demolition, deterioration, overload, alteration collapses, fire, explosion and vibration, collision, wind damages, towers and masts, storm at sea, storm on land, lightening damage, rain-ponding effect – Explain the repair's involved for rectifying the above failure.
- 5.3 Describe the failures due to ignorance and negligence – Ignorance, or incompetence, negligence, control and supervision, responsibility.
- 5.4 Explain the repairs involved for rectifying the above failures.
- 6.0 Understand the Maintenance problems and their solutions**
- 6.1 Describes the list of defects in buildings bringing out the investigation and remedial details.
- 6.2 State the methods of solving dampness problems in buildings.
- 6.3 Explain the causes, preventive and corrective methods of cracks in building.
- 6.4 Explain the maintenance operations for the Water supply and sanitary components of building.

- 6.5 Explain the methods of maintenance of roads / road berms / side drains.
- 6.6 Explain methods of repairs to canal linings.
- 6.7 Use of Leak proof chemicals for R.C.C roofs.

COURSE CONTENT

- 1. Introduction**
 - a) Definition of error, defect, failure – Causes of failures.
- 2. Sub-surface construction failures and repairs**
 - a) Failures in Foundations – Under mining – Load transfer failures – Lateral movement – Unequal support – Settlement and Differential Settlement – Uplift in expansive soils compression failure, erection difficulty, temperature change, Deformation and cracking – Drag down and heave – Design error – Construction error – Flotation and water change – Vibration effect – Earthquake effect – repairing techniques to be adopted.
 - b) Failures during excavation – Sheeting and bracing – piles and caissons – sewers and tunnels – measures to be taken.
- 3. Surface construction failures and repairs**
 - a) Earthen bunds – failures – slope failures and sliding – subsidence – measures to be taken to prevent surface construction failures – measures to be taken – retaining walls and abutments – geo-membranes – Rivetment and pitching.
- 4. Masonry and concrete failures, repairs**
 - a) Wall failures – Construction error – Aging – Joints and crakes – Water tightness – Masonry cladding – Partitions – Ornamental screens – Plastering failures - repairs.
 - b) Concrete failures – Improper mix design, curing, placement of reinforcement and handling of pre cast elements – shrinkage failures – expansion and plastic changes – surface disintegration due to fire – spalling of concrete – repairs.
- 5. Man-made and natural failures, rehabilitation**
 - a) Demolition – Deterioration – Overload – Alteration collapses – Fire – Explosion and Vibration – Collision – wind damages of towers and masts – Storm at sea – Storm on Land – Lighting damage – rain-ponding – effects – rehabilitation measures.
- 6. Maintenance problems and their solutions**
 - a) Water proofing, leakage of basements and roofs – Treating dampness in walls – Omission of DPC – Window sills, down pipes and other areas of

- damp penetration – Cico water proofing.
- b) Cracks in walls – Horizontal, Vertical, diagonal – causes and prevention of cracks in buildings – Care of floors, removing stains from floors – Inks, rust, oil, paint and varnish.
 - c) Maintenance problems of plumbing, heating, hot water supply, clogged drains, sewers, leaking pipe joints, electrical installations, other building services, septic tanks and soak pits.
 - d) Maintenance of roads, road-berms and side drains.
 - e) Strengthening of canals, embankments, silt clearance weed removal, repairs to canal lining.
 - f) Leak proofing of water tanks and roofs use of chemicals for RCC roofs.

REFERENCE BOOKS

1. Construction Failure by Jacob Feld - John Wiley & Sons, New York, London.
2. Failures & Repairs of Concrete Structure by S. Champion - John Wiley & Sons, New York, London.
3. Engineering Structural Failures by Rolt Hammond – Odham Press, London
4. Learning from Failures by Raikar
5. Building Failures Diagnosis and Avoidance by Ran Son W.H. – Publishing E and F.N. Span.
6. Maintenance Engineering for Civil Engineers-- Nayak B.S. , Khanna Publisher's, Delhi
7. SP: 25 –1987 Causes and prevention of cracks in buildings by BIS

QUALITY CONTROL & SAFETY IN CONSTRUCTION

Subject Title	:	Quality control & Safety in construction
Subject Code	:	C-605
Periods/ week	:	04
Periods/year	:	60

TIME SCHEDULE

Sl. No	Major Topics	No. of Periods	Weight age of Marks	Short Answer Type	Essay Type
1	Specifications and Standards	12	26	2	2
2	Quality control	06	13	1	1
3	Statistical Analysis and Tolerance	06	13	1	1
4	Introduction to safety in construction Activities	06	16	2	1
5	Causes of Accidents and Safety Measures	24	29	3	2
6	Prevention of accidents	06	13	1	1
	Total	60	110	10	08

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OBJECTIVES

Upon completion of the subject the student shall be able to

- 1.0 Know different specifications and standards**
 - 1.1 State different specifications of buildings.
 - 1.2 Explain functional aspects of different structures.
 - 1.3 Describe detailed specification for various items of work.
 - 1.4 Prepare detailed specification from general description.
 - 1.5 List relevant IS codes.
 - 1.6 Identify sizes for building components.
 - 1.7 Identify standards.
 - 1.8 Understand standards for industrial buildings.
 - 1.9 Explain Management aspects of quality control.
 - 1.10 Describe Advisory Organization.

- 1.11 Describe Management Functions and Regulations.
 1.12 State PWD & CPWD Guidelines for field officers.
- 2.0 Understand the production and Quality control of construction works and Tolerance levels**
- 2.1 Describe control aspects of batching and mixing.
 2.2 Explain the inspection of reinforcement grills.
 2.3 Explain the inspection and examination of formwork.
 2.4 Describe the quality of the filler materials.
 2.5 Establish relationship between the strength of brickwork and strength of mortar.
- 3.0 Understand statistical basis for modern quality control**
- 3.1 Describe Mathematical probability.
 3.2 Describe sampling plan.
 3.3 Explain sampling risks of acceptance and rejections.
 3.4 State the tolerances levels in construction industry.
 3.5 Understand visual appearance.
 3.6 State the dimensional accuracies.
- 4.0 Understand the safety aspects to be taken in construction works**
- 4.1 Describe the safety requirements against fire hazards
 4.2 Describe the safety while using construction machinery
 4.3 Describe the safety during the demolition of buildings
 4.4 Describe the preventive methods of accidents
- 5.0 Understand the causes of Accidents and Safety measures**
- 5.1 Define accidents.
 5.2 List the causes of accidents.
 5.3 Role of loss control approach in the cost of the accidents.
 5.4 Describe the cost aspects of accidents and measures.
 5.5 Describe the General safety program.
 5.6 Prepare accidents reports.
 5.7 Describe the safety measures to be taken for storage and handling of building materials.
 5.8 Describe the safety requirements in formwork and scaffolding.
 5.9 Explain the safety in excavation & pile driving in foundation.

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- 5.10 Describe the safety measures to be taken in construction of building elements.
 5.11 Describe the safety measures to be taken in demolition of buildings.
 5.12 Describe the safety measures to be taken for hot bituminous works.
 5.13 Describe the safety measures to be taken in supporting structural work.
- 6.0 Understand the Planning for accident prevention**
- 6.1 Define 1. Risk and 2. Risk management.
 6.2 Explain the role of risk management.
 6.3 Describe the planning for accident prevention.
 6.4 Evaluate risks and losses and cost control works
 6.5 Describe the management measures for controlling losses

COURSE CONTENT**Quality Control**

1. (a) Specification for buildings – functional aspects of residential, commercial and industrial structures – Detailed Specifications for various items of work – preparation of detailed specification from general description – Modular Coordination – relevant IS codes – Preferred size for building components – Performance standards – Standards for industrial buildings.
 (b) Management aspects of quality control – advisory organization management functions – Statutory regulations – State PWD & CPWD guide lines for field officers.
- 2. (a) Production & quality control of concrete – general – batching – mixing – inspection of reinforcement grill and form work.**
- (b) Quality control in Masonry works – quality of filler materials – Brick – stone – quality of mortar – relation between strength of brick work Vs strength of bricks Vs strength of mortar.
3. (a) Statistical basis for modern quality control – Simple examples of mathematical probability – Sampling plan – Sampling risks of acceptance and rejection.
 (b) Tolerance levels in construction industry – Visual appearance – dimensional accuracies.
- Safety**
4. Introduction – safety against fire hazards – Fire & fire fighting – Fire rating of building materials – fire prevention standards – safety in use of

- construction machinery – lifting machinery, earth moving machinery and conveyors, demolition of buildings – Loading standards for buildings – The safety programme – Accident due to fall – preventive methods.
5. (a) Causes of accidents – Classification of construction accidents – Cost of accidents – loss control approach in the cost of accidents – measurement of accidents – Salient features of 'A safety programme' – General safety programmes for construction – Accident report.
- (b) Safety Measure for storage & handling of building materials – Safety Measure in construction of elements of building – Safety in excavation & pile driving – foundations – form work – scaffolding – roofing – safety on fragile roof – other items of work – Safety Measure in demolition of buildings – Safety Measure for hot bituminous works – Safety Measure for scaffolding, Ladders form work and other equipment – erection of prefabricated components and transportation – erection of steel structures – Safety measures for excavation.
6. Planning for accident prevention – evaluation of risk and loss potential in the work. vis-a-vis cost of control measures – loss control approach through accident prevention and other risk management measures for controlling losses due to personnel, legal, liability losses – property losses.

REFERENCE BOOKS

- Design of Foundations & Detailing by Er.A.Veerappan & Er. A.Pragadeeswaran
- A.J. and C.J.Willis. "Specification writing", Crossby Lockwood, London.
- Norbert-L.Enrick "Quality control and reliability" Industrial press Inc., NY
- R. Nagrajan, "Standards In Buildings", Pitman publishing, 1976.
- Vincent G.Bush, "Safety in Construction industry-OSHA"
- Estimation and Costing by Dutta
- S.Purushotham & G. Vaidyanathan "Safety in Construction Industry", Central Labour Institute, Bombay
- "Accident Prevention in Construction", Associated General Contractors of America
- Standards on safety—BIS
- Shrivastava, U.K., "Construction Planning and Management", Galgotia Publications Pvt. Ltd, # 5, Ansari road, Daryaganj, New delhi.
- Design and Construction failures by DOV Kamimanetzky, Galgotia publications, New Delhi.

CIVIL ENGINEERING WORK SHOP

Subject title	:	Civil Engineering Workshop
Subject code	:	C-606
Periods per week	:	03
Periods per semester	:	45

TIME SCHEDULE

Sl. No.	Major Topic	No. of periods
1	Carpentry	5
2	Bar Bending of steel reinforcement	10
3	Plumbing exercises	10
4	Electrical Exercises	20
Total		45

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OBJECTIVES

Upon completion of the subject the student shall be able to

- 1.0 Understand the elements of carpentry in connection with the erection of scaffolding and form work with a particular reference to use of braces**
- State various components of scaffolding
 - State precautions to be taken while erecting scaffolding
 - Explain the method of fixing various elements of scaffolding
 - State precautions to be taken to fix the various elements of scaffolding at required position.
 - Connect various elements of scaffolding.
 - Explain various aspects of form work to be considered while fixing various elements
 - Explain the method of fixing of form work at required position for various elements of building construction
 - Connect various elements of formwork.

2.0 Understand the skills of bending of reinforcing bars as per the bar bending schedule.

- 2.1 Identify various tools used for bending of reinforcing bars.
- 2.2 Read the data required from bar bending schedule for bending of bars.
- 2.3 Mark the salient points of location of bending on the bars as per the bar bending schedule.
- 2.4 Bend the bars using the specified tools to the exact shape as per bar bending schedule as specified in IS-2502(Code of practice for bending and fixing of bars for concrete reinforcement)
- 2.5 Prepare the grills as per the drawings of the structural elements using binders, stirrups, links etc. appropriate to the element.

3.0 Understand the elements of plumbing practice and procedure of fixing of various plumbing fixtures

- 3.1 Identify the different pipe specials and state their functions
- 3.2 Practice thread cutting on PVC/GI pipes
- 3.3 Assemble the pipe line for toilet block with taps, showers and wash basins using specific pipe specials.
- 3.4 Fix the floor trap, gully trap and water closet of a house to the drainage pipes.

4.0 Understand the various aspects of electrical installations used in buildings and their fixing at appropriate locations

- 4.1 Identify various electrical accessories, Wires and cables
 - a. Mains switch
 - b. MCB
 - c. Fuse
 - d. Switches (SPST SPDT)
 - e. Rotary switch
 - f. Push Button Switches
 - g. 2 pin Sockets
 - h. 3pin /Power sockets
 - i. Ceiling Rose
 - j. Lamp Holders.
 - (a) Identify line, neutral and earth terminals in power sockets and power plugs by physical observation and using Tester
 - k. Use of test lamp

- 4.2 Identify different wires and cables
 - a. Know the wire gauge
 - b. Specifications of electrical wires
 - c. VIR, PVC, TRS wires
 - d. Flexible wires and cables
 - e. Power cords.
- 4.3 Study of earthing and earth pit
- 4.4 Study of different wiring systems
 - (a) Open conduit system
 - (b) Concealed conduit system
- 4.5 Use of Digital Multimeter to
 - a. Identify the Range selector
 - b. Selection of appropriate range to measure
 - i. AC Voltage
 - ii. DC Voltage (Battery)
 - iii. AC Current (Through a lamp/heater)
 - iv. Check continuity
 - v. Resistance
- 4.6 Connect a fuse in the main circuit
 - a. Know the metals suitable for fuse wire
 - b. Selecting a correct fuse wire rating for a given electrical load
- 4.7 Connect a low current (3A) MCB in the circuit and testing
- 4.8 Control the lamp using a switch
- 4.9 Control the fan with a switch and regulator
- 4.10 Connect a i) 2-pin socket ii) 2-pin socket with switch control
- 4.11 Control one lamp with 2 switches (Staircase wiring)
- 4.12 Know Power consumption of various Appliances like
 1. Tungsten Lamp
 2. CFL Lamp
 3. Fan.
 4. Fluorescent lamps (Tube Lights).
 5. Air cooler
 6. Water heater,

7. Geiser
8. Electric Iron
- 4.13 Estimate the total connected load
4.14 Study of inverter/UPS wiring
4.15 Electrical estimation and costing
4.16 Study of 3-phase system

KEY Competencies to be achieved by the student

S. No	Experiment Title	Competencies	Key Competency
1	Fixing of scaffolding	<ul style="list-style-type: none"> Measuring lengths of props accurately Fixing braces at required locations correctly to support various other scaffolding members Choosing suitable size of members to support load coming over the scaffolding 	<ul style="list-style-type: none"> Measuring lengths of props accurately Choosing suitable size of members to support load coming over the scaffolding
2	Positioning of form work	<ul style="list-style-type: none"> Adjusting the lengths of props correctly to support the weight of RCC elements Fixing up of various elements of form work firmly to support the weight of RCC elements 	<ul style="list-style-type: none"> Fixing up of various elements of form work firmly to support the weight of RCC elements
3	Bar Bending of steel reinforcement	<ul style="list-style-type: none"> Cutting of rods to the suitable lengths correctly Maintaining the angle of cranking correctly Maintaining required spacing of rods as per the design and drawings provided 	<ul style="list-style-type: none"> Cutting of rods to the suitable lengths correctly Maintaining the angle of cranking correctly
4	Plumbing Exercises	<ul style="list-style-type: none"> Using appropriate tools Selection of suitable pipe specials Making connections to various sanitary installations 	<ul style="list-style-type: none"> Making connections to various sanitary installations
5	Electrical Exercises	<ul style="list-style-type: none"> Adopting suitable type of electrical fixtures for intended usage Using suitable material in required quantities for making earthing for an electrical installation 	<ul style="list-style-type: none"> Using suitable material in required quantities for making earthing for an electrical installation

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COURSE CONTENT

- Carpentry**
 - Erection of Scaffolding Material
 - Position of Shuttering
 - Fixing of form work.
- Bar Bending of steel reinforcement**

Preparation of bar bending schedule

 - Bar bending with bar bending schedule
 - Method of bar bending for Earthquake resistant structures
 - Field visit to automated bar bending
- Plumbing exercises**
 - Thread cutting on GI/PVC pipes
 - Assembling of pipe lines for toilet with two taps, shower and wash basin
 - Fixing of floor traps, gully traps, water closet, drain pipes
 - Laying stoneware/PVC pipes and construction of inspection chambers
- Electrical Exercises**
 - Identify various electrical accessories
 - Identify line, neutral and earth terminals in power sockets and power plugs
 - Measure the AC voltage between line and neutral using DMM
 - Study of earthing and earth pit
 - Study of different wiring systems
 - Open conduit system
 - Concealed conduit system
 - Measurement of the following using DMM
 - AC Voltage
 - DC Voltage (Battery)
 - AC Current (Through a lamp/heater)
 - Check continuity
 - Resistance
 - Connecting a fuse in the main circuit

- viii. Controlling the lamp using a switch
- ix. Controlling the fan with a switch and regulator
- x. Connect a i) 2-pin socket ii) 2-pin socket with switch control
- xi. Control one lamp with 2 switches (Staircase wiring)
- xii. Study of inverter/UPS wiring
- xiii. Electrical estimation and costing
- xiv. Study of 3-phase system

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STRUCTURAL ENGINEERING DRAWING

Subject Title : Structural Engineering Drawing
Subject Code : C-607
Periods per Week : 06
Periods per Semester : 90

TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage of marks	Short Type	Essay Type
1.	Structural Planning and marking of Frame components	09	04	01	-
2.	R.C.C. Drawings	42	28	02	01
3.	Reading and interpretation of Structural Drawings	09	04	01	-
4.	Steel Drawings	30	24	01	01
Total		90	60	05	02

NOTE: All questions are to be answered. Part-A: 5X4=20 marks & Part-B: 2X20=40 marks

NOTE: Use HYSD bars for main reinforcement.

OBJECTIVES

Upon completion of the subject the student shall be able to

- 1.0 Understand structural planning of a building and marking of Frame components**
 - 1.1 Understand Positioning and Orientation of columns
 - 1.2 Understand Positioning of beams
 - 1.3 Understand Spanning of slabs
 - 1.4 Explain layout of stairs
 - 1.5 List types of footings
 - 1.6 Prepare member reference scheme of given building following

1. Column reference scheme and
2. Grid reference scheme (Scheme recommended by IS:5525 – recommended for detailing of reinforced concrete works and SP-34)

2.0 Draw the detailed working drawings of R.C.C.

- 2.1 Draw the longitudinal section and cross sections of singly reinforced simply supported beam.
 - 2.2 Prepare schedule of reinforcement and quantity of steel for singly reinforced simply supported beam
 - 2.3 Draw the longitudinal and cross section of lintel cum sunshade
 - 2.4 Prepare schedule of reinforcement and quantity of steel for lintel cum sunshade
 - 2.5 Draw the plan and longitudinal section of one-way slab showing reinforcement details.
 - 2.6 Prepare schedule of reinforcement and quantity of steel for one-way slab showing reinforcement details
 - 2.7 Draw the details of reinforcement of two-way simply supported slab with corners not held down condition.
 - 2.8 Draw top and bottom plan and section along short and long spans of two-way simply supported slab with corners not held down condition
 - 2.9 Prepare schedule of reinforcement of two-way simply supported slab with corners not held down condition
 - 2.10 Draw the details of reinforcement of two-way simply supported slab with corners held down conditions.
 - 2.11 Draw top and bottom plan and section along short and long spans have to be drawn. (Scheduling of reinforcement is not necessary).
 - 2.12 Draw the details of reinforcement of one-way continuous slab along with T- beam with details of slab and T-beam (plan and section of continuous slab and longitudinal section of T-beam have to be drawn). (Scheduling of steel is not necessary)
 - 2.13 Draw the details of column and square footing (plan and sectional elevation) prepare schedule of reinforcement of column and footing and quantity of steel required.
 - 2.14 Draw the reinforcement details of dog legged stair case (section only) prepare schedule of reinforcement for one flight including landing.
- ## 3.0 Read and interpret the drawings
- 3.1 Understand the details of reinforcement from the given drawings
 - 3.2 Fill in the details of reinforcement in a drawing.
- ## 4.0 Draw the detailed working drawings of steel structures
- 4.1 Draw the sectional plan, elevation and cross section of built up beam showing the details of curtailment of plates and connection details.

- 4.2 Draw the details of built up column with lacing and batten system showing the details of connections by welding (plan, elevation with three systems of lacing/batten systems)
- 4.3 Draw the details of steel column base with details of gusset plate. Plan, section parallel to web, section parallel to flange showing the connections with welded joints.
- 4.4 Draw the details of Fan roof truss with angular and tubular sections along with details of connections at ridge, heel, bottom chord and roof coverings (welded connections).
- 4.5 Draw the details of reinforcement of frame designed as earth quake resistant structure.

COURSE CONTENT

1.
 - a) Draw the position of columns, beams, slabs, stairs and footing in a given line diagram of building
 - b) Prepare member reference scheme of given building following
 - i) Column reference scheme as per IS:696 code of practice for general engineering drawing.
 - ii) Grid reference scheme as per IS:5525 – recommendations for detailing of reinforced concrete works.
2. Singly reinforced simply supported rectangular beam.
3. Lintel cum sunshade.
4. Simply supported one-way slab.
5. Two-way slab simply supported corners not held down.
6. Two-way slab simply supported corners held down.
7. One-way continuous slab and T-beam (with details of slab and T-beam)
8. Column with square footing of uniform thickness.
9. Stair case – stairs spanning longitudinally (Dog legged stair case)
10. Built up beam with two cover plates with details of curtailment of plates.
11. Built up column with lacing and battening systems.
12. Gusseted column base (with welded connections),
13. Fan roof truss – 8 m span with angular and tubular sections connected by welding.
14. Frame showing the details of reinforcement for earth quake resistant structures.

REFERENCE BOOKS

1. Designing and detailing hand book SP-34

CONSTRUCTION TECHNOLOGY PRACTICE

Subject Title	:	Construction Technology Practice
Subject Code	:	C-608
Periods/ Week	:	03
Periods/Semester	:	45

TIME SCHEDULE

Sl.No	List of Experiments	No. of periods
	Tests on Road Aggregate	15
1	Specific Gravity of fine and coarse aggregate	
2	Impact value of coarse aggregate	
3	Crushing value of coarse aggregate	
4	Abrasion value of coarse aggregate	
5	Flakiness Index of coarse aggregate	
6	Elongation Index of coarse aggregate	
	Tests on Concrete	20
7	Slump test on concrete	
	(a) Study the changes in workability by adding cement paste to poorly workable concrete	
	(b) Study the changes in workability by adding dry cement to poorly workable concrete	
8	Compaction factor test on concrete	
	(a) Study the changes in compactor of a poorly workable concrete by admixtures	
	(b) Study the methods of enhancing workability of concrete without using any admixtures	
9	Casting of Cement concrete cubes	

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10	Testing of cement concrete cubes for compression	
	(a) Compare the compressive strengths of concrete cubes made and cured with potable water and concrete cubes made and cured with non-potable water	
	(b) Compare the compressive strengths of concrete cubes of concrete made with gap graded coarse aggregate and that made with well graded coarse aggregate	
11	Split Tensile Strength of concrete	
12	Design mix of concrete proportion	10
	Non-destructive tests on concrete	
13	Surface hardness test(Rebound hammer)	
14	Ultrasonic test	
	Tests on Soil	10
15	Sieve Analysis – Classification of soil	
16	Field Density of soil(Sand Replacement Method)	
17	Proctor Compaction Test	45
	Total:	

OBJECTIVES

Upon completion of the subject the student shall be able to

- 1.0 Determine suitability of given sample of aggregate for road construction**
- Specific Gravity of fine and coarse aggregate**
- 1.1 Study the importance of specific gravity of fine and coarse aggregate
 - 1.2 State the range of specific gravity values for various naturally available fine and coarse aggregate
 - 1.3 Use the apparatus required for conducting specific gravity test on both fine and coarse aggregate
 - 1.4 Perform the specific gravity tests for both fine and coarse aggregate

Impact value of coarse aggregate

- 1.5 Study the significance of impact value of aggregate used for road construction
- 1.6 State the standards on impact value of aggregate used for various civil engineering works as per IS-383
- 1.7 Use the apparatus required for conducting impact test on aggregate
- 1.8 State the procedure for preparing the sample and no.of samples required for the given work
- 1.9 Explain the procedure for conducting impact test on aggregate
- 1.10 Perform impact test on given sample of coarse aggregate
- 1.11 Draw inferences by conducting impact test on different types of natural aggregate

Crushing value of coarse aggregate

- 1.12 Study the significance of crushing value of aggregate used for various civil engineering works
- 1.13 State the standards on crushing value of aggregate used for various civil engineering works as per IS-383
- 1.14 Use the apparatus required for conducting crushing test on aggregate
- 1.15 State the procedure for preparing the sample and no.of samples required for the given work
- 1.16 Explain the procedure for conducting crushing test on aggregate
- 1.17 Perform crushing test on given sample of coarse aggregate
- 1.18 Draw inferences by conducting crushing test on different types of natural aggregate

Abrasion value of coarse aggregate

- 1.19 Study the significance of abrasion value of aggregate used for various civil engineering works
- 1.20 State the standards on abrasion value of aggregate used for various civil engineering works as per IS-383
- 1.21 Use the apparatus required for conducting abrasion test on aggregate
- 1.22 State the procedure for preparing the sample and no.of samples required for the given work
- 1.23 Explain the procedure for conducting abrasion test on aggregate
- 1.24 Perform abrasion test on given sample of coarse aggregate
- 1.25 Draw inferences by conducting abrasion test on different types of natural aggregate

Flakiness Index of coarse aggregate

- 1.26 Study the significance of flakiness index of aggregate on strength and workability properties of concrete
- 1.27 State the standards on flakiness index of aggregate
- 1.28 Use the apparatus required for conducting flakiness index of coarse aggregate
- 1.29 Explain the procedure for conducting the flakiness index test on coarse aggregate

Elongation Index of coarse aggregate

- 1.30 Study the significance of elongation Index of aggregate on strength and workability properties of concrete
- 1.31 State the standards on elongation Index of aggregate
- 1.32 Use the apparatus required for conducting elongation Index of coarse aggregate
- 1.33 Explain the procedure for conducting the elongation Index test on coarse aggregate

- 2.1 Determine suitability of fresh and hardened concrete for the given conditions of workability and strength
- 2.2 Study the importance of workability on strength properties of concrete
- 2.3 State various types of tests used for measuring the workability of fresh concrete
- 2.4 State standards on workability of concrete used for different places of construction work

Slump cone test

- 2.5 Use apparatus required for conducting slump test
- 2.6 Explain the procedure for conducting slump test of workability
- 2.7 Perform slump test on the concrete made of given sample of ingredients
- 2.8 Draw inference from test results on slump test of workability of concrete made with coarse aggregate having different elongation index
- 2.9 Draw inference from test results on slump test of workability of concrete made with coarse aggregate having different flakiness index
- 2.10 Compare the slumps of concrete made with gap graded coarse aggregate and well graded coarse aggregate
- 2.11 Study the changes in workability by adding cement paste to poorly workable concrete
- 2.12 Study the changes in workability by adding dry cement to poorly workable concrete

Compaction factor test

- 2.13 State the purpose of compaction of concrete
- 2.14 Use apparatus required for conducting compaction factor test
- 2.15 Explain the procedure for conducting compaction factor test of workability
- 2.16 Perform compaction factor test on the concrete made of given sample of ingredients
- 2.17 Draw inference from test results on compaction factor test of workability of concrete made with coarse aggregate having different elongation index values
- 2.18 Draw inference from test results on compaction factor test of workability of concrete made with coarse aggregate having different flakiness index values
- 2.19 Compare the compaction factors of concrete made with gap graded coarse aggregate and that made with well graded coarse aggregate
- 2.20 Study the changes in compactor of a poorly workable concrete by admixtures
- 2.21 Study the methods of enhancing workability of concrete without using any admixtures

Casting of Cement concrete cubes

- 2.22 Study the purpose of casting of concrete cubes
- 2.23 Use equipment required for casting of cement concrete cubes
- 2.24 Explain the procedure for casting concrete cubes
- 2.25 Cast the concrete cubes with given ingredients

Testing of cement concrete cubes for compression

- 2.26 Study the importance of testing concrete cubes
- 2.27 Use equipment required for conducting compression test concrete cubes
- 2.28 State the precautions to be taken for testing of concrete cubes
- 2.29 Explain the procedure for conducting compression test on concrete cubes
- 2.30 Draw inference from test results on compressive strength of concrete cubes made with coarse aggregate having different elongation index values
- 2.31 Draw inference from test results on compressive strength of concrete cubes made with coarse aggregate having different flakiness index values
- 2.32 Compare the compressive strengths of concrete cubes of concrete made with gap graded coarse aggregate and that made with well graded coarse aggregate

- 2.33 Compare the compressive strengths of concrete cubes made and cured with potable water and concrete cubes made and cured with non-potable water

Split Tensile Strength of concrete

- 2.34 Study the importance of split tensile strength of concrete
- 2.35 Cast the concrete cylinders with given ingredients
- 2.36 Explain the procedure for conducting split tensile strength test on concrete cylinders
- 2.37 Perform split tensile strength test on concrete cylinder

Design mix of concrete proportion as per IS: 10262 - 2009

- 2.38 Study the various elements of design mix of concrete as per IS:10262-2009
- 2.39 Conduct tests to find specific gravity, bulk density and sieve analysis of aggregate for the preparation of design mix of concrete
- 2.40 Write the procedure for design mixing of concrete
- 2.41 Calculate the proportions of ingredients of concrete as per IS:10262-2009
- 2.42 Cast cubes of trial mixes to decide the proportion of concrete
- 2.43 Perform the compression tests on concrete cubes casted as per design mix

3.0 Understand the significance of various non-destructive tests on concrete

- 3.1 State the importance of non-destructive tests
- 3.2 State the apparatus/equipment required for the non-destructive tests
- 3.3 Explain the procedure for conducting non-destructive tests
- 3.4 Perform the non-destructive tests like Rebound hammer tests, ultrasonic tests on the given hardened concrete
- 3.5 Record the observations of tests
- 3.6 Draw the inferences from the test results
- 4.0 Determine various engineering properties of soils used for various Civil Engineering Activities

Sieve Analysis – Classification of soil

- 4.1 Study the classifications of various types of soils
- 4.2 Use apparatus required for conducting sieve analysis of soils
- 4.3 Explain the procedure for conducting sieve analysis of soils
- 4.4 Perform sieve analysis over a given soil sample

Atterberg Limits of Soil

- 4.5 Study the significance of Atterberg limits of soil in civil engineering activities
- 4.6 Study Atterberg limits of soils
- 4.7 Use apparatus required for conducting tests to determine Atterberg limits of soil
- 4.8 Explain the procedure for conducting Atterberg limits of soil
- 4.9 Perform tests to determine liquid limit, plastic limit, shrinkage limit and plasticity index of a given soil sample
- 4.10 Calculate the values of Atterberg limits of given soil sample from the observations of tests
- 4.11 Classify given soil sample based on sieve analysis and Atterberg limits

Field Density of soil (Sand Replacement Method)

- 4.12 Study the significance of field density of soil
- 4.13 Use the apparatus required for conducting field density of soil
- 4.14 Explain the procedure for conducting field density test on soil by sand replacement method
- 4.15 Perform field density test of soil by sand replacement method

Proctor Compaction Test

- 4.16 Study the significance of proctor compaction test
- 4.17 Use the apparatus required for conducting proctors compaction test
- 4.18 Explain the procedure for conducting proctor compaction test
- 4.19 Perform proctor compaction test over given sample of soil
- 4.20 Compare the observations of tests conducted on different types of soils
- 4.21 Draw the graph for proctor's compaction test
- 4.22 Calculate the values OMC and MDD of given soil sample from the observations of test

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KEY Competencies to be achieved by the student

S. No	Experiment Title	Competencies	Key Competency
1	Specific Gravity of fine and coarse aggregate	<ul style="list-style-type: none"> Take weights of empty pycnometer, pycnometer with water and pycnometer with aggregate accurately Record the observations accurately Calculate the values correctly 	<ul style="list-style-type: none"> Take weights of empty pycnometer, pycnometer with water and pycnometer with aggregate accurately
2	Impact value of coarse aggregate	<ul style="list-style-type: none"> Prepare of sample correctly Weigh the cup and aggregate accurately Count number of strokes accurately Weigh residue retained on 2.36 mm sieve correctly 	
3	Crushing value of coarse aggregate	<ul style="list-style-type: none"> Prepare of sample correctly Weigh the mould and aggregate accurately Apply the load at required rate and to the required period accurately Weigh residue retained on 2.36mm sieve correctly 	<ul style="list-style-type: none"> Apply the load at required rate and to the required period accurately
4	Abrasion value of coarse aggregate	<ul style="list-style-type: none"> Weigh the aggregate accurately Count the required number of rotations correctly Weigh residue retained on 1.70 mm sieve accurately 	
5	Flakiness Index of coarse aggregate	<ul style="list-style-type: none"> Arrangement of sieves in correct order Weighing the aggregate passing through thickness gauge correctly 	
6	Elongation Index of coarse aggregate	<ul style="list-style-type: none"> Arrange the sieves in correct order Weigh the aggregate retaining over length gauge correctly 	

7	Slump cone test on concrete	<ul style="list-style-type: none"> • Weigh the material accurately • Apply required no. of tappings for each layer of concrete • Measure the subsidence accurately 	<ul style="list-style-type: none"> • Measure the subsidence accurately
8	Compaction factor test on concrete	<ul style="list-style-type: none"> • Weigh the material accurately • Weigh the mould and concrete accurately • Calculate the compactor factor correctly 	
9	Casting of Cement concrete cubes	<ul style="list-style-type: none"> • Weigh the material accurately • Vibrate the concrete filled in moulds to the required time correctly • Cure the demoulded cubes to the required period 	<ul style="list-style-type: none"> • Weigh the material accurately • Vibrate the concrete filled in moulds to the required time correctly
10	Testing of cement concrete cubes for compression	<ul style="list-style-type: none"> • Apply the load at required rate correctly • Record the load at FAILURE accurately • Calculate the compressive strength accurately 	<ul style="list-style-type: none"> • Apply the load at required rate correctly
11	Split Tensile Strength of concrete	<ul style="list-style-type: none"> • Apply the load at required rate correctly • Record the load at FAILURE accurately • Calculate the split tensile strength accurately 	<ul style="list-style-type: none"> • Apply the load at required rate correctly • Calculate the split tensile strength accurately
12	Design mix of concrete proportion	<ul style="list-style-type: none"> • Calculate the proportions of material correctly • Weigh the ingredients of concrete accurately as per design mix calculations 	<ul style="list-style-type: none"> • Calculate the proportions of material correctly
13	Non-destructive tests on concrete	<ul style="list-style-type: none"> • Applying the load at required rate as per procedure correctly • Calculating the strength of hardened concrete from graphs accurately 	<ul style="list-style-type: none"> • Applying the load at required rate as per procedure correctly

14	Sieve Analysis – Classification of soil	<ul style="list-style-type: none"> • Weigh of residue in each sieve accurately 	
15	Field Density of soil(Sand Replacement Method)	<ul style="list-style-type: none"> • Calibrate the apparatus correctly • Weigh the samples accurately • Calculate the density accurately 	<ul style="list-style-type: none"> • Calibrate the apparatus correctly • Weigh the samples accurately
16	Proctor Compaction Test	<ul style="list-style-type: none"> • Weigh the soil correctly • Measure the water accurately • Apply required no. of blows of compaction accurately • Record the observations correctly • Draw graph correctly 	<ul style="list-style-type: none"> • Weigh the soil correctly • Measure the water accurately • Draw graph correctly

COURSE CONTENT

1. **Tests on Road aggregate**
 - a. Specific Gravity of fine and coarse aggregate
 - b. Impact value of coarse aggregate
 - c. Crushing value of coarse aggregate
 - d. Abrasion value of coarse aggregate
 - e. Flakiness index of coarse aggregate
 - f. Elongation index of coarse aggregate
2. **Tests on concrete**
 - a. Workability test by Slump Cone Test
 - b. Workability test by Compaction factor test
 - c. Casting of Cement concrete cubes
 - d. Testing of Cement concrete cubes for compression
 - e. Split tensile strength of concrete
 - f. Design mix of concrete proportion
3. **Non-destructive tests on concrete**
 - a. Surface hardness test(Rebound hammer test)
 - b. Ultrasonic Test
4. **Tests on Soil**
 - a. Sieve analysis-classification of soil.

- b. Liquid limit and plastic limit
- c. Field density of soil (sand replacement method)
- d. Proctor Compaction Test

REFERENCE BOOKS

1. Concrete Technology – M.S. Shetty,
S. Chand & Company Ltd., New Delhi.
2. Concrete Technology(5/E) – M.L. Gambhir-TMH
3. Soils Mechanics – B.C. Punmia
4. Engineering Properties of soils and their measurement – Joseph E. Bowles – TMH

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PROJECT WORK

Subject Title	:	Project Work
Subject Code	:	C-609
Periods/Week	:	07
Periods/Semester	:	105

OBJECTIVES

- 1.1 Identifies different works to be carried out in the Project.
- 1.2 Collects data relevant to the project.
- 1.3 Carries out Site Surveys.
- 1.4 Selects the most efficient method from the available choices based on preliminary investigation.
- 1.5 Designs the required elements of the project as per standard practices.
- 1.6 Prepares working drawings for the project.
- 1.7 Estimates the cost of project, men, materials and equipment required.
- 1.8 Prepares schedule of time and sequence of operations.
- 1.9 Prepares project report.
- 1.10 Prepares C.P.M. Chart.
- 1.11 Collects the requirements to start a Small Enterprise/Industry under Self Employment Scheme.
- 1.12. Collects the necessary information to procure necessary finance, site and equipment.
- 1.13 Prepares the chart or model for each project.

COURSE CONTENT

Project work is intended to provide training in the solution of field engineering problems involving Surveying, Planning, drawing plans, designing, estimating and marking out of a building/highway/irrigation/public health project. Project work will also include the preparation of the feasibility report for any one type of enterprise under self – employment schemes.

Students shall be divided into groups of five each and shall be assigned a problem that calls for application of the knowledge he/she acquired in the course and also which involves some extra study of reference materials.

Problems

- a) Planning of a Campus.
- b) Building project.
- c) Industrial complex
- d) Irrigation project.
- e) Rural Water Supply Scheme.
- f) Sanitary Engineering Scheme.
- g) Bridge project.
- h) Low Cost Housing Scheme.
- i) Design of framed structure type building by using a software package.
- j) Set up of a small enterprise under self employment scheme.

Every student should prepare a project report and submit the same for assessment. Every student puts his share to the work in all the operations of the project. The end examination in Project work shall consist of power point presentation and Viva-voce test to be assessed by a panel of examiners comprising of an External examiner, the Head of Section, and member of staff who guided the project as Internal examiner.

168**Scheme of assessment**

1)	Seminar	-	20 Marks
2)	Internal assessment	-	20 Marks
3)	Power point presentation	-	60 Marks (3x20)
	& Viva – Voce		
	Total		----- 100 -----