ACADEMIC REGULATIONS,  
PROGRAM STRUCTURE  
AND SYLLABUS  

CIVIL 
ENGINEERING  

For  
B.Tech FOUR YEAR DEGREE PROGRAM  
(Applicable for the batches admitted from 2017-18)  
(I to VIII Semesters)  

ADITYA ENGINEERING COLLEGE  
(An Autonomous Institution)  
Approved by AICTE, Affiliated to JNTUK & Accredited by NBA, NAAC with 'A' Grade  
Recognized by UGC under the sections 2(f) and 12(B) of UGC act 1956  
Aditya Nagar, ADB Road, SURAMPALEM - 533 437
ABOUT ADITYA ENGINEERING COLLEGE

ADITYA ENGINEERING COLLEGE (AEC) was established in 2001 at Surampalem, Kakinada, Andhra Pradesh in 125 Acres of pollution free and lush green landscaped surroundings by the visionaries of Aditya Academy who are in the glorious service field of education since last 33 years.

AEC believe in the holistic development of society at large and are researching its efforts in multi-disciplinary activities. We shoulder the responsibility of shaping the Intellect, Character and Physique of every student, because we believe that these students would be the architects to develop a humanized and harmonious society, and the nation as a whole.

Our vision is to impart education, in a conductive ambience, as comprehensive as possible, with the support of all the modern technologies and produce graduates and post graduates in engineering with the ability and passion to work wisely, creatively, and effectively for the betterment of our society. It is our endeavor to develop a system of Education which can harness students’ capabilities and the muscles of the mind thoroughly trained to enable it to manifest the great feats of intellectualism which it is capable of.

SALIENT FEATURES:

- An Autonomous Institution.
- Accredited by NAAC with “A” Grade in 2015 and NBA in 2008.
- Recognized by UGC under sections 2(f) & 12(B).
- Affiliated to JNTUK, Kakinada.
- Recognized by Scientific and Industrial Research Organizations (SIROs) of Department of Scientific and Industrial Research, Ministry of Science and Technology, Govt. of India.
- Bagged Grade “A” (top grade) by the Govt. of A.P.
- Dept. of Science and Technology under Technology Development Board has sanctioned Incubation Centre and only one College in the state received this financial Assistance.
• Best Rankings & Ratings given to Aditya by reputed Magazines & journals in their surveys:
  ➢ Grade AAA by careers 360.
  ➢ One of the best 20 Engineering colleges in India by The Sunday Indian.
  ➢ South India IV rank by Digital Mailers.
  ➢ South India VI rank by Silicon India.
  ➢ India 13th Rank out of top 25th Engineering Colleges by 4Ps.
  ➢ Asia’s Top 100 colleges by WCRC Leaders.
  ➢ Higher Education Review 35th Rank in India.
  ➢ South India’s 68th Rank, India’s 99th Rank by the Week magazine.
  ➢ 8th Rank in providing high quality infrastructure out of 10 engineering Colleges in India by The Week magazine and more ……

• The college has students from 17 states across India & 13 foreign countries.
• 150+ foreign students.
• Honored with Best Placement Award by Chief Minister of Andhra Pradesh.
• Only one college in AP received Best Performance Award from Tech Mahindra for its outstanding achievement in campus placements.
• Remarkable achievement of campus placements in CMM Level 5 Companies
• Students received Gold Medals at University level.
• Offering most job potential engineering courses of Petroleum Engineering, Mining Engineering, and Agricultural Engineering in addition to the regular courses of Mechanical, Civil, and EEE, ECE, CSE and IT at UG, PG and Diploma Levels.
• Skill Development Centre with the collaboration of Govt. of A.P. (APSSDC)
• Siemens Centre of Excellence Campus.
• PMKVVY Skill Development Centre Campus.
• South India’s first Microsoft Ed-vantage Platinum Campus.
• Campus of Microsoft innovation centre.
• Adobe’s Centre of Excellence Campus.
• Campus of CISCO Networking Academy.
• MOU with 4 Foreign Universities.
• MOU with Educational Consultants India Ltd., (EdCil).
• On campus Nationalized Bank with 8 ATMs facility.
• On campus hostels with world class infrastructure facilities & 50+ resident staff.
• Own transportation facility to pickup and drop the students and staff covering all the villages in the District with more than 60 buses.
ACADEMIC REGULATIONS (AR17)
Applicable for the students admitted from the academic year 2017-18 onwards

1. AWARD OF B. TECH. DEGREE
A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations.

1.1 If he pursued a Program of study in not less than four and not more than eight academic years.

1.2 The student shall register for 180 credits and secure all the 180 credits.

2. PROGRAMS OF STUDY
The following Programs of study are offered at present as specializations for the B. Tech. Program with as medium of Instruction.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Branch</th>
<th>Program code</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Civil Engineering</td>
<td>01</td>
</tr>
<tr>
<td>02</td>
<td>Electrical and Electronics Engineering</td>
<td>02</td>
</tr>
<tr>
<td>03</td>
<td>Mechanical Engineering</td>
<td>03</td>
</tr>
<tr>
<td>04</td>
<td>Electronics and Communication Engineering</td>
<td>04</td>
</tr>
<tr>
<td>05</td>
<td>Computer Science and Engineering</td>
<td>05</td>
</tr>
<tr>
<td>06</td>
<td>Information Technology</td>
<td>12</td>
</tr>
<tr>
<td>07</td>
<td>Mining Engineering</td>
<td>26</td>
</tr>
<tr>
<td>08</td>
<td>Petroleum Technology</td>
<td>27</td>
</tr>
<tr>
<td>09</td>
<td>Agricultural Engineering</td>
<td>35</td>
</tr>
</tbody>
</table>

3. DISTRIBUTION AND WEIGHTAGE OF MARKS
3.1 The performance of a student in each semester shall be evaluated course-wise with a maximum of 100 marks for both Theory and Practical courses. The Industry-Oriented (Internship) Minor Project shall be evaluated for 50 marks, Major Project work for 200 marks, Audit courses for 50 marks and Employability Skills course for 50 marks.

3.2 For theory courses, the distribution shall be 40 marks for Sessional evaluation and 60 marks for the End - Examinations. There shall be 2 Sessional examinations during the semester. The Sessional marks shall be awarded by giving a weightage of 80% for best of the two Sessional
examinations and 20% for the other Sessional examination. The I Sessional examination (Descriptive, Objective and Assignment) is conducted for first 2 ½ units of syllabus and II Sessional examination for the remaining 2 ½ units for each course in a semester. The weightage of Sessional marks for 40 consists of Descriptive - 24, Objective -10 (Conducted at College level with 20 Multiple choice questions with a weightage of ½ mark each) and Assignment - 06 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, Quiz, Term paper, Tutorial, Surprise test, Seminar, Case study, Lab activity, Minor Project, etc. as the case may be and for Physics-Virtual lab, for Mathematics - MATLAB). For Assignment, the nature of test will be intimated by the concerned faculty member at the beginning of the semester. The descriptive examination is conducted for 90 minutes and the objective examination is for 20 minutes. Each descriptive examination question paper shall contain 3 questions of equal marks and all questions need to be answered. The Objective examination is conducted for 10 marks and descriptive examination is conducted for 24 marks are to be added to the assignment of 06 marks for finalizing Sessional marks of 40. The End examination is conducted for 60 marks in duration of 180 minutes, which contains ten questions, two questions are from each unit and each question may have sub questions. The student has to write one question from each unit, each question carries 12 marks.

3.3 For practical courses, there shall be continuous evaluation during the semester for 40 Sessional marks and 60 End examination marks. The Sessional 40 marks shall be awarded as, day-to-day work-15 marks, observation and Record-10 marks and laboratory Exam -15 marks. The End examination shall be conducted by the concerned teacher and external examiner appointed by the Principal.

3.4 For design and / or drawing, (such as Engineering Drawing, Machine Drawing) and estimation courses, the distribution shall be 40 marks for Sessional evaluation (20 marks for day - to - day work, and 20 marks for Sessional examination) and 60 marks for End examination. There shall be two Sessional examinations in a Semester. The Sessional marks shall be awarded by giving a weightage of 80% for the best of two Sessional
examinations and 20% for the other Sessional examination.

3.5 For audit courses, during a semester there shall be one examination for 50 marks for a duration of 180 minutes in which a student should get minimum 40% of the marks for satisfactory, otherwise the student is considered as not satisfactory. The examination is conducted by covering the topics of all units, which contains five 10 marks questions with internal choice from each unit and each question may have sub questions. If a student failed to get satisfactory marks or is absent for examination, he has to write the exam in that course when conducted next.

3.6 For Employability Skills as audit course, during a semester there shall be one examination for 50 marks. The duration of examination is 100 minutes. The examination shall be conducted in objective type (Multiple choice questions with weightage of $\frac{1}{2}$ mark each), in which a student should get minimum 40% of the marks for satisfactory; otherwise the student is considered as not satisfactory. If a student failed to get satisfactory marks or is absent for examination, he has to write the exam in that course when conducted next.

3.7 For Employability Skills as credit course, the exam is conducted for 50 marks in which 20 marks are conducted for Sessional examination and 30 marks for End examination. For Sessional marks, during the semester there shall be two Sessional examinations. The duration of Sessional examination is 40 minutes and for End examination is 60 minutes. Both the Sessional and End examinations are conducted in objective type (Multiple choice questions with weightage of $\frac{1}{2}$ mark each). The Sessional marks shall be awarded by giving 80% weightage for the best of two Sessional examinations and 20% weightage for other Sessional examination.

3.8 For Industry-Oriented (Internship) Minor Project, the students have to do a project in collaboration with an industry of their specialization, during the vacation after VI Semester End examination. However, the minor project and its report shall be evaluated in VII Semester. The Minor Project shall be submitted in report form and should be presented before the committee, which shall be evaluated for Sessional marks of 50. The committee consists of Head of the Department, Supervisor of the minor
3.9 For Major Project, 200 marks are awarded out of which 80 marks shall be for Sessional Evaluation and 120 marks for the End Examination. The Sessional Evaluation shall be on the basis of two seminars given by each student on the topic of his major project and evaluated by an internal committee that consists of Head of the Department, Supervisor of the major project and one senior faculty of the department. The End Examination (Viva-Voce) shall be conducted by the committee that consists of an External Examiner (appointed by Principal from the panel of three members given by HOD), Head of the Department and Supervisor of the major project.

4. ATTENDANCE REQUIREMENTS

4.1 A student shall be eligible to write the End examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses.

4.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) on a medical grounds in a semester may be granted by the College Academic Committee and a student can be condoned for a maximum of three times only.

4.3 Shortage of Attendance below 65% in aggregate shall not be condoned.

4.4 Students whose shortage of attendance is not condoned in any semester are not eligible to write their End examinations of that semester.

4.5 A fee of Rs. 500/- shall be payable towards condonation for shortage of attendance.

4.6 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester.

4.7 If any student fulfills the attendance requirement in the present semester, he shall not be eligible for re-admission into the same semester.

4.8 A student who is shortage of attendance in a semester may seek re-admission into that semester when offered within 2 weeks from the date of the commencement of class work.
MINIMUM ACADEMIC REQUIREMENTS

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.4.

4.1 A student is deemed to have passed a course and earns the credits allotted to that course by securing not less than 35% of marks in the End examination, and minimum 40% of marks of the total marks (sum of Sessional marks and End examination marks).

4.2 A student will be promoted from IV semester to V semester, if he fulfills the academic requirement of 50% of the credits up to IV semester from all the examinations, whether or not the student takes the examinations.

4.3 A student shall be promoted from VI semester to VII semester if he fulfills the academic requirements of 50% of the credits up to VI semester from all the examinations, whether or not the students takes the examinations.

4.4 All the credit courses shall be considered for calculation of SGPA and CGPA.

5. PROGRAM PATTERN

5.1 The entire Program of study is for four academic years and all the years are in semester pattern.

5.2 A student is eligible to appear for the End examination in a course, but absent from it or has failed in the End examination, may write the exam in that course when conducted next.

5.3 When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

6. AWARD OF DEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree, he shall be placed in one of the following four classes:
Class Awarded | CGPA to be secured | From the CGPA Secured from 180 Credits
---|---|---
First Class with Distinction | ≥7.75 with no course failures | |
First Class | ≥6.75 with course failures | |
Second Class | ≥5.75 to <6.75 | |
Pass Class | ≥4.75 to <5.75 | |

6.1 Cumulative Grade Point Average (CGPA)

The following procedure is to be adopted to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

<table>
<thead>
<tr>
<th>Range of Marks (%)</th>
<th>Letter Grade</th>
<th>Level</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 90</td>
<td>O</td>
<td>Outstanding</td>
<td>10</td>
</tr>
<tr>
<td>≥ 80 to &lt;90</td>
<td>A+</td>
<td>Excellent</td>
<td>9</td>
</tr>
<tr>
<td>≥ 70 to &lt;80</td>
<td>A</td>
<td>Very Good</td>
<td>8</td>
</tr>
<tr>
<td>≥ 60 to &lt;70</td>
<td>B+</td>
<td>Good</td>
<td>7</td>
</tr>
<tr>
<td>≥ 50 to &lt;60</td>
<td>B</td>
<td>Fair</td>
<td>6</td>
</tr>
<tr>
<td>≥ 40 to &lt;50</td>
<td>P</td>
<td>Satisfactory</td>
<td>5</td>
</tr>
<tr>
<td>&lt;40</td>
<td>F</td>
<td>Fail</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>Absent</td>
<td>0</td>
</tr>
</tbody>
</table>

**COMPUTATION OF SGPA**

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

\[
SGPA(S_i) = \frac{\sum (C_i \cdot G_i)}{\sum C_i}
\]

Where \( C_i \) is the number of credits of the \( i^{th} \) course and \( G_i \) is the grade point scored by the student in the \( i^{th} \) course.

**COMPUTATION OF CGPA**

i. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of the Program, i.e.
\[ CGPA = \frac{\sum (C_i S_i)}{\sum (C_i)} \]

Where \( S_i \) is the SGPA of the \( i^{th} \) semester and \( C_i \) is the total number of credits in that semester.

ii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iii. Equivalent Percentage = (CGPA - 0.75) x 10

7. MINIMUM INSTRUCTION DAYS
The minimum instruction days for each semester shall be 90 working days.

8. TRANSFER
8.1 Aditya Engineering College (AEC) proposes to practice JNTUK / State government guidelines for transfer.
8.2 There shall be no branch transfers after the completion of the admission process.

9. WITHHOLDING OF RESULTS
If the student not paid any dues to the college or involved in indiscipline activities, his result will be withheld.

10. TRANSITORY REGULATIONS
10.1 Discontinued or detained students are eligible for readmission as and when next offered.
10.2 The readmitted students will be governed by the regulations under which the student has been admitted.
10.3 a) In case of transferred students from other Universities / colleges, the credits shall be transferred to AEC as per the academic regulations and course structure of the AEC.
    b) The students seeking transfer to AEC from various other universities/institutions have to obtain the credits of any equivalent courses as prescribed by college. In addition the transferred students have to pass the failed courses at the earlier institute.

11. GENERAL
11.1 Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
11.2 The academic regulations should be read as a whole for the purpose of any interpretation.

11.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

11.4 The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

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ACADEMIC REGULATIONS (AR17) LATERAL ENTRY
Applicable for the students admitted into III semester from the Academic Year 2018-19 onwards

1. AWARD OF B. TECH. DEGREE
A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

1.1 If he pursues a course of study in not less than three academic years and not more than six academic years.

1.2 The student shall register for 133 credits and secure all the 133 credits. All the credit courses shall be considered for calculation of SGPA and CGPA.

2. PROMOTION RULE
2.1 A student shall be promoted from VI semester to VII semester if he fulfills the academic requirements of 50% of the credits up to VI semester from all the examinations, whether or not the student takes the examinations.

3. AWARD OF CLASS
After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. degree, he shall be placed in one of the following four classes:

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>CGPA to be secured</th>
<th>From the CGPA Secured from 133 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>≥7.75 with no course failures</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>≥6.75 with course failures</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>≥5.75 to &lt;6.75</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>≥4.75 to &lt;5.75</td>
<td></td>
</tr>
</tbody>
</table>

4. All the other regulations applicable to B. Tech Program remain the same for B. Tech Lateral Entry also.
MALPRACTICES RULES
Disciplinary Action for /Improper Conduct in Examinations

The Chief controller of examinations shall refer the cases of malpractices in Sessional and
End Examination to an Enquiry Committee constituted by him / her. The Committee will
submit a report on the malpractice allegedly committed by the student to the Chief
Controller of Examinations. The Chief Controller of Examinations along with the
members of the Committee is authorized to impose a suitable punishment, if the student is
found guilty as per the following guidelines.

<table>
<thead>
<tr>
<th>Nature of Malpractices / Improper conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>If the candidate</strong></td>
<td></td>
</tr>
<tr>
<td>1(a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course only.</td>
</tr>
<tr>
<td><em>(b)</em> Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the examination hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2 Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester.</td>
</tr>
<tr>
<td>3 Comes in a drunken condition to the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Impersonates any other candidate in connection with the examination.</td>
</tr>
<tr>
<td>Clause</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>8</td>
<td>Refuses to obey the orders of the Chief controller of examinations / Observer / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction or property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
</tr>
<tr>
<td>9</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
</tr>
<tr>
<td>10</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
</tr>
<tr>
<td></td>
<td>Clauses</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
</tr>
<tr>
<td>12</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Chief controller of examinations for further action to award suitable punishment.</td>
</tr>
</tbody>
</table>
Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

<table>
<thead>
<tr>
<th>Act</th>
<th>Imprisonment Upto</th>
<th>Fine Upto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teasing, Embarrassing and Humiliation</td>
<td>+ 6 months</td>
<td>+ Rs. 1,000/-</td>
</tr>
<tr>
<td>Assaulting or Using Criminal force or Criminal intimidation</td>
<td>+ 1 Year</td>
<td>+ Rs. 2,000/-</td>
</tr>
<tr>
<td>Wrongfully restraining or confining or causing hurt</td>
<td>+ 2 Years</td>
<td>+ Rs. 5,000/-</td>
</tr>
<tr>
<td>Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence</td>
<td>+ 5 Years</td>
<td>+ Rs. 10,000/-</td>
</tr>
<tr>
<td>Causing death or abetting suicide</td>
<td>+ 10 Years</td>
<td>+ Rs. 50,000/-</td>
</tr>
</tbody>
</table>

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE ADITYA A RAGGING FREE CAMPUS
Ragging

ABSOLUTELY
NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE ADITYA A RAGGING FREE CAMPUS
VISION & MISSION OF THE COLLEGE

VISION
To induce higher planes of learning by imparting technical education with International standards, Applied research, Creative ability and Value based instruction to emerge as a premier institute.

MISSION
Achieving academic excellence by providing globally acceptable technical education by forecasting technology through

- Innovative research & development
- Industry institute interaction
- Empowered manpower

VISION & MISSION OF THE DEPARTMENT

VISION
To produce globally employable, technically competent and ethically sound Civil Engineering Professionals.

MISSION
M1: By imparting and enriching students with technical knowledge and problem solving skills.
M2: By following a teaching - learning process abreast with changing industry needs and current societal challenges.
M3: By establishing a successful Industry and Institution collaboration.
M4: By providing better quality departmental infrastructure to promote civil engineering research activities.

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**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

**Graduates of the Program will**

<table>
<thead>
<tr>
<th>PEO 1</th>
<th>Have successful professional career in Civil engineering.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO 2</td>
<td>Analyze, design and build safe, sustainable and economical structures in all Civil engineering areas.</td>
</tr>
<tr>
<td>PEO 3</td>
<td>Display communication skills and leadership quality needed to deal with industry and society.</td>
</tr>
<tr>
<td>PEO 4</td>
<td>Engage in life-long learning and service to their profession for the betterment of society and environment.</td>
</tr>
</tbody>
</table>

**PROGRAM OUTCOMES (POs)**

**After successful completion of the program, the graduate will be able to**

<table>
<thead>
<tr>
<th>PO 1</th>
<th>Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO 2</td>
<td>Identify, formulate, research literature and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.</td>
</tr>
<tr>
<td>PO 3</td>
<td>Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.</td>
</tr>
<tr>
<td>PO 4</td>
<td>Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.</td>
</tr>
<tr>
<td>PO 5</td>
<td>Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.</td>
</tr>
<tr>
<td>PO 6</td>
<td>Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.</td>
</tr>
<tr>
<td>PO 7</td>
<td>Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of, and need for sustainable development.</td>
</tr>
<tr>
<td>PO 8</td>
<td>Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.</td>
</tr>
<tr>
<td>PO 9</td>
<td>Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.</td>
</tr>
<tr>
<td>PO 10</td>
<td>Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.</td>
</tr>
<tr>
<td>PO 11</td>
<td>Demonstrate knowledge and understanding of engineering management principles and apply these to one’s own work, as a member and leader in a team and to manage projects in multidisciplinary environments.</td>
</tr>
<tr>
<td>PO 12</td>
<td>Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</td>
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</tbody>
</table>

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

After successful completion of the program, the graduate will be able to

| PSO 1 | Survey, map, measure and analyze data for sustainable civil engineering infrastructure planning. |
| PSO 2 | Analyze and design concrete & steel structures, earthen embankments, irrigation structures, water supply, waste treatment systems and transport systems considering public health and safety, cultural, societal and environmental aspects. |
| PSO 3 | Develop the skills to identify, formulate and solve civil engineering problems using modern tools and techniques like STAAD Pro V8i, Robot Structural Analysis, Revit, etc. |
| PSO 4 | Apply ethical principles and commit to professional ethics and responsibilities and norms of civil engineering practice. |

**Mission of the department – PEOs mapping**

<table>
<thead>
<tr>
<th>PEOs Statements</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
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<tr>
<td>PEO 1: Have successful professional career in Civil engineering.</td>
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<td>PEO 2: Analyze, design and build safe, sustainable and economical structures in all Civil engineering areas.</td>
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<td>PEO 3: Display communication skills and leadership quality needed to deal with industry and society.</td>
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<td>PEO 4: Engage in life-long learning and service to their profession for the betterment of society and environment.</td>
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**Note**: |

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<tr>
<th>Bloom’s Taxonomy Knowledge Level</th>
<th>Knowledge Level Representation</th>
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<td>Evaluate</td>
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**Mapping / Correlation levels**

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)
# PROGRAM STRUCTURE

## I SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Course Component</th>
<th>Total Number of contact hours</th>
<th>Credits (C)</th>
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BS: Basic Sciences; HSS: Humanities and Social Sciences; ES: Engineering Sciences; PC: Professional Core; PE: Professional Elective; OE: Open Elective; SS: Self Study Course; PR: Project.

## II SEMESTER

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### III SEMESTER

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### VI SEMESTER

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MOOCs – Massive Open Online Courses
## VII SEMESTER

<table>
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<th>Course Component</th>
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<td>PE</td>
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Program curriculum grouping based on course components

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<td><strong>100</strong></td>
<td><strong>235</strong></td>
<td><strong>180</strong></td>
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Rules for opting MOOCs

- Students should register for a course with prior permission from MOOCS-Coordinator of the department. User ID should be submitted to the MOOCS – Coordinator after the registration. It is through this User ID only; the student has to write the proctored examination.

- Students should register only for Technical Subjects. However, they can register for Interdisciplinary subjects also.

- Students have to register for a technical course which is not yet studied or will not be studied in the upcoming semesters.

- Students should register for a course with duration of $\geq 4$ weeks or $\geq 20$hrs.

- Students MOOCS Certificate is considered only if the students write the examination under a proctored system. If the student registers a course where he/she has to write an unproctored online examination, he/she should bring it to the notice of the HOD for conducting the exam in the college. These exams will be usually planned on Saturdays.

- For MOOCS -1, the course completion certificate should be submitted to the MOOCS- Coordinator before the completion of V Semester end examinations.

- For MOOCS -2, the course completion certificate should be submitted to the MOOCS- Coordinator before the completion of VI Semester end examinations.
ENGLISH – I
(Common to all branches)

I Semester

Course Code: 171HS1T01

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Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

Course Objectives:

COB 1: To improve the language proficiency of the students in English with emphasis on LSRW skills.

COB 2: To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.

COB 3: To develop the communication skills of the students in both formal and informal situations.

COB 4: To appraise the learner how Gandhi spent a period of three years in London as a student.

COB 5: To make the learners rediscover India as a land of knowledge.

COB 6: To discuss how scientific point of view seeks to arrive at the truth without being biased by emotion.

COB 7: To inform the learner that all men are in peril.

COB 8: To inspire the learners by inventions and contributions of great achievers.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.

2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.

3. To enable the students to listen for general content, to fill up information and for specific information.
SPEAKING SKILLS:

Objectives:
1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like role-plays, discussions and debates.
5. To make the students participate in just a minute talks.

READING SKILLS:

Objectives:
1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:
1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences, paragraphs, e-mails and essays.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students to write coherently and cohesively.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Summarize how Gandhi grew in introspection.
CO 2: Explain the conditions to achieve a higher quality of life, strength and sovereignty of a developed nation.
CO 3: Identify the scientific attitude to solve many problems which we find difficult to tackle.
CO 4: Identify that all men can come together and avert the peril.
CO 5: Interpret humorous texts and use of words for irony.
CO 6: Explain the characteristic traits of renowned scientists who contributed enormously to the scientific advancement of India.
CO 7: Demonstrate writing and basic concepts of grammar skills.
Mapping of Course Outcomes with Program Outcomes

<table>
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<tr>
<th>CO/PO</th>
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<th>PO 2 (K4)</th>
<th>PO 3 (K5)</th>
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Mapping of Course Outcomes with Program Specific Outcomes

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Methodology:

1. The class is to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Recommended Topics:

UNIT-I:
1. IN LONDON: M.K.GANDHI (Detailed)
2. G.D. NAIDU (Non-Detail)

UNIT-II:
1. THE KNOWLEDGE SOCIETY- APJ ABDUL KALAM (Detailed)
2. G.R. GOPINATH (Non-Detail)

UNIT-III:
1. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE (Detailed)
2. J.C. BOSE (Non-Detail)
UNIT-IV:
1. MAN’S PERIL-BERTRAND RUSSELL (Detailed)
2. HOMI JEHANGIR Bhabha (Non-Detail)

UNIT-V:
1. LUCK—MARK TWAIN (Detailed)
2. A SHADOW (Non-Detail)

Textbooks:


Web Links:
3. http://btechenglish.blogspot.in/2014/01/the-scientific-point-of-view-j-b-s.html

****
MATHEMATICS-I
(Common to all branches)

I Semester
Course Code: 171BS1T01

Course Objectives:

COB 1: To equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.

COB 2: To help the students acquire a necessary base to develop analytical and design skills.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Associate linear differential equations of first order to various physical problems involving differential equations of first order

CO 2: Solve linear differential equations of higher order.

CO 3: Solve linear systems of equations using the concept of rank, Gauss elimination, Gauss Seidal method.

CO 4: Find the eigen values and eigen vectors.

CO 5: Associate the concepts of Partial Differentiation to maxima and minima of functions of several variables and to Partial differential equations.

Mapping of Course Outcomes with Program Outcomes:

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</table>
UNIT I:
Differential equations of first order and first degree:
Linear differential equations - Bernoulli differential equation - Exact differential equations-Equations reducible to exact (Type-1, Type-2, Type-3, Type-4)

Applications:

UNIT II:
Linear differential equations of higher order:
Linear differential equations of higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)- Method of Variation of parameters, Method of undetermined coefficients.
*(MATLAB Exercise: Introduction to MAT LAB commands and Solution of Initial Value Problems using the command ‘dsolve’)

Applications:
Electric circuits, simple harmonic motion.

UNIT III:
Linear systems of equations:

Applications:
Finding the current in electrical circuits.

UNIT IV:
Eigen values - Eigen vectors and Quadratic forms:
Eigen values - Eigen vectors– Properties of eigen values (without proof ) – Cayley - Hamilton theorem (without proof ) - Inverse and powers of a matrix by using Cayley - Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form using orthogonal transformation– Nature of the quadratic form.
*(MATLAB Exercise: All Basic Operations on matrices are to be implemented using MATLAB including computation of rank, computation of eigen values and eigen vectors)

UNIT V:
Partial differentiation and Partial differential equations:
Homogeneous function-Euler’s theorem-Total derivative-Chain rule-Taylor’s and Maclaurin’s series expansion of functions of two variables– Functional dependence-Jacobian.

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation, nonlinear (standard types) equations.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).
*(MATLAB Exercise: To Plot graphs of various single and multivariable functions using MATLAB and analyze their maxima and minima graphically).

Text Books:
2. Dr.T.K.V. Iyengar, Engineering Mathematics, S. Chand publications.

Reference Books:
3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
5. Glyn James, Advanced modern engineering mathematics, Pearson education.
6. MATLAB by Rudra Pratap, Getting started with MATLAB, Oxford Publication.

Web Links:
3. https://www.khanacademy.org
4. http://nptel.ac.in/courses/122104017

****
ENVIRO ENVIRONMENTAL STUDIES (Common to CE, EEE, ME, Min.E, PT & Ag.E)
I Semester
Course Code: 171HS1T02

Course Objectives:

COB 1: To define the various ecosystems and its diversity.
COB 2: To summarize the overall natural resources.
COB 3: To classify environmental impacts of developmental activities.
COB 4: To discuss social issues, environmental legislation and global treaties.
COB 5: To educate environmental management systems.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Identify the need for protecting the producers and consumers in various ecosystems and their role in the food web.
CO 2: Outline the natural resources and their importance for the sustenance of the life.
CO 3: List out the biodiversity of India, threats and its conservation methods.
CO 4: Illustrate various attributes of the pollution, impacts and measures to control the pollution along with waste management practices.
CO 5: Describe social issues both rural and urban environment to combat the challenges.
CO 6: Summarize the legislations of India in environmental protection.
CO 7: Classify environmental assessment and the stages involved in EIA.

Mapping of Course Outcomes with Program Outcomes:

<table>
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<tr>
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UNIT – I:
Ecosystems:
Scope of environmental studies, Structure- Producers, consumers and decomposers
Function – Food chain, Food web, Tropic structure and Energy flow in the ecosystem

UNIT – II:
Natural Resources:
Natural resources and associated problems Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people
Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources vs oil and natural gas extraction.
Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT – III:
Biodiversity and its conservation:
Definition: genetic, species and ecosystem diversity classification Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT – IV:
Environmental Pollution:
Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Style.
Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e–waste management.

UNIT – V:
Social Issues and the Environment
Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Global challenges

Text Books:
1. Environmental Studies, K.V. S. G. Murali Krishna, VGS Publishers, Vijayawada

Reference Books:

Web Links:
1. https://www.youtube.com/watch?v=7G3eXI_DPn8
2. www.nptel.ac.in/courses/122102006/
3. www.nptel.ac.in/courses/120108002/
5. www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html
6. www.nptel.ac.in/courses/120108004/

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ENGINEERING CHEMISTRY
(Common to CE, ME, Min.E, PT & Ag.E)

I Semester

Course Code: 171BS1T03

Course Objectives

COB 1: To impart knowledge about polymers and plastic materials that are used in household appliances, aerospace and automotive industries.

COB 2: To nurture students about fuels as energy source used in industries like thermal power plant, steel industry, fertilizer industry etc., and automobiles.

COB 3: To impart knowledge about working of primary, secondary cells. Theories of corrosion and its control methods.

COB 4: To impart knowledge on advance materials like Nano, Super Conductors also Semi Conductors and Liquid Crystals.

COB 5: To educate students about the importance of water in industries and household purposes.

Course Outcomes

At the end of the Course, Student will be able to:

CO 1: Explain polymeric materials their uses and moulding techniques of plastics.

CO 2: Classify solid, liquid and gaseous fuels.

CO 3: Explain about batteries, corrosion and their control methods.

CO 4: Explain Nano materials, Super Conductors, Semi Conductors and Liquid Crystals.

CO 5: Summarize water purification techniques and boiler troubles.

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UNIT- I:
High Polymers and Plastics:

UNIT - II:
Fuel Technology:

UNIT - III:
Electrochemical Cells and Corrosion:

UNIT - IV:
Chemistry of Advanced Materials:
Super conductors:-Type –I, Type II – Characteristics and applications
Semi conductors: - Preparation of semiconductors, working of diodes and transistors.
Green synthesis:-Principles
Liquid crystals:-Introduction – Types – Applications

UNIT - V:
Water Technology
Hard water:- Reasons for hardness – units of hardness - determination of hardness and alkalinity - Water for steam generation - Boiler troubles – Priming and Foaming, Scale formation, Boiler corrosion, Caustic embrittlement - Internal treatments - Softening of Hard water : Lime – Soda process, Zeolite process and numerical problems based on these

Text Books:
1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. A Text books of Applied Chemistry by Dr. Bharathi kumari Yalamananchili, VGS publications.

Reference Books:

Web Links:

****
ENGINEERING MECHANICS  
(Common to CE, EEE, ME, Min.E, PT & Ag.E)  

I Semester  

Course Code: 171ES1T02  

Course Objectives:  

COB 1: To impart knowledge on the concept of forces and its resolution in different planes, resultant of force system, forces acting on a body, their free body diagrams using graphical methods and to know the concept of friction.  

COB 2: To make the students calculate the centre of gravity and moment of inertia.  

COB 3: To educate the students about kinematics, kinetics, work-energy and impulse-momentum principles.  

Course Outcomes:  

At the end of the Course, Student will be able to:  

CO 1: Determine the resultant force and moment for a given force system.  

CO 2: Explain the concept of friction.  

CO 3: Calculate the forces in planar and spatial systems.  

CO 4: Locate centroid of composite areas and centre of gravity of composite bodies.  

CO 5: Calculate the moment of inertia of composite areas and rigid bodies.  

CO 6: Apply the concepts of kinematics, kinetics, work-energy and impulse-momentum methods to particle motion.  

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UNIT-I:
**Introduction to Engineering Mechanics** – Basic Concepts.
Friction: Introduction, limiting friction and impending motion, Coulomb’s laws of dry friction, coefficient of friction, cone of friction.

UNIT-II:

UNIT-III:
**Centroid:** Centroid of simple figures (from basic principles) – Centroid of composite figures.
**Centre of Gravity:** Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.

UNIT-IV:
**Area Moment of Inertia:** Definition – Polar Moment of Inertia, Transfer Theorem, Moment of Inertia of composite figures.
**Mass Moment of Inertia:** Moment of Inertia of masses, Transfer formula for Mass Moment of Inertia, Mass Moment of inertia of composite bodies.

UNIT – V:
**Kinematics:** Basics of linear motion.
**Kinetics:** Particle and Rigid body in translation – Central force motion – Equations of plane motion – Fixed axis rotation.

Text Books:

Reference Books:
Web Links:

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COMPUTER PROGRAMMING
(Common to all branches)

I Semester

Course Code: 171ES1T01

Course Objectives:

COB 1: To impart adequate knowledge on the need of programming languages and problem solving techniques.
COB 2: To develop programming skills using the fundamentals and basics of C language.
COB 3: To enable effective usage of Control Structures, arrays, Strings, functions, structures and union.
COB 4: To impart the knowledge of pointers and to understand the principles of dynamic memory allocation.
COB 5: To illustrate the file concepts and its operations.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Illustrate the basic concepts of Computers.
CO 2: Solve mathematical and scientific problems using fundamentals of C.
CO 3: Use Control Structures and Arrays in solving complex problems.
CO 4: Develop modular programs to solve problems using control structures, Arrays and strings.
CO 5: Demonstrate the pointers concept for allocating and reallocating memory dynamically.
CO 6: Solve real world problems using the concept of structures and unions.
CO 7: Develop real time applications using file operations.

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UNIT-I:
Computer History, Hardware, Software, Programming Languages and Algorithms:

Introduction to C Programming:
Introduction, Structure of a C Program, Identifiers, main() function, printf() function, Indentation, Comments, Keywords, Data Types, Variables, Constants and Declarations, Input/Output Statements, Operators, Type Conversion.

UNIT -II:
Control Flow, Relational Expressions & Arrays:
Selection: if, if-else, nested if with examples, Multi-way selection: switch, else-if with examples. Repetition: Basic Loop Structures: for, while and do-while loops, counter controlled and condition controlled loops, nested loops, goto, continue and break.
Arrays: Introduction, Operations on Arrays, 2D Arrays, Arrays as Function Arguments, Multi Dimensional Arrays.

UNIT-III:
Functions:
Basics of Functions: Declaration, Definition and call, Categories of Functions, passing parameters to Functions, Variable Scope, Storage Classes, Recursive Functions, Recursion and its Types.
Strings:
String Fundamentals, String Processing with and without Library Functions.

UNIT-IV:
Pointers:
Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function arguments, Pointer to Pointer, Pointers and Arrays, Pointers and Strings, Dynamic Memory Allocation Functions, Dangling Pointer, Command line Arguments.

UNIT-V:
Structures:
Introduction to Structures, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, derived data type, bit-fields.

Data Files:
Introduction to Files, Using Files in C, Reading and Writing with Text Files, Error Handling during File Operations, Random File Access.

Text Books:
1. Computer Programming, Reema Thareja, OXFORD.
Reference Books:
2. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Web Links:
3. http://nptel.ac.in/courses/122104019/
5. https://www.tutorialspoint.com/cprogramming/

****
ENGLISH COMMUNICATION SKILLS LAB- I
(Common to all branches)

I Semester
Course Code: 171HS1L01

Course Objectives:

COB 1: To facilitate computer-aided multi-media instruction enabling individualized and independent language learning.
COB 2: To sensitize the students to the nuances of English speech sounds, word accent and intonation.
COB 3: To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
COB 4: To improve the fluency in spoken English and neutralize mother tongue influence.
COB 5: To train students to use language appropriately.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Demonstrate nuances of language through audio-visual experience and Group activities.
CO 2: Identify accent for intelligibility.
CO 3: Demonstrate in conversation, jams and public speaking.
CO 4: Make use of the concepts to communicate confidently and competently in English Language in all spheres.

Mapping of Course Outcomes with Program Outcomes:

<table>
<thead>
<tr>
<th>CO/PO</th>
<th>PO 1 (K3)</th>
<th>PO 2 (K4)</th>
<th>PO 3 (K5)</th>
<th>PO 4 (K5)</th>
<th>PO 5 (K3)</th>
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Mapping of Course Outcomes with Program Specific Outcomes:

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</table>
PRACTICE 1:
A. Greeting, Introducing and taking leave
B. Pure Vowels

PRACTICE 2:
A. Giving Information and Asking for Information
B. Diphthongs

PRACTICE 3:
A. Inviting, Accepting and Declining Invitations
B. Consonants

PRACTICE 4:
A. Commands, Instructions and Requests
B. Accent and Rhythm

PRACTICE 5:
A. Suggestions and Opinions
B. Intonation

Reference Books:
1. Strengthen your Communication Skills by Dr. M. Hari Prasad, Dr. Salivendra J. Raju and Dr. G. Suvarna Lakshmi, Maruthi Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. A Handbook of English for Professionals by Prof Eliah, B.S Publications.
5. Word power made handy, Dr. Shalini Verma, S. Chand Company.
6. Let us hear them speak, Jayashree Mohanraj, Sage texts.
ENGINEERING CHEMISTRY LAB  
(Common to CE, ME, Min.E, PT & Ag.E)

I Semester  
Course Code: 171BS1L01

Course Objectives:

COB 1:  To demonstrate volumetric, conductometric, potentiometric titrations and pH determination.
COB 2:  To educate students about the preparation of thermosetting plastic such as Bakelite and alternative fuel such as Bio-diesel.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1:  Demonstrate Acid – Base Redox & Complexometric titrations by volumetric analysis.
CO 2:  Demonstrate Acid – Base titrations by instrumental analysis.
CO 3:  Prepare polymer like Bakelite.
CO 4:  Prepare alternative fuel like Bio-Diesel.

Mapping of Course Outcomes with Program Outcomes:

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<tr>
<td>CO4 (K3)</td>
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</table>

Exercise 1:
Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.

Exercise 2:
Trial experiment - Determination of HCl using standard Na₂CO₃ solution.

Exercise 3:
Preparation of Phenol - Formaldehyde resin (Bakelite).

Exercise 4:
Determination of KMnO₄ using standard Oxalic acid solution.
Exercise 5:  
Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.

Exercise 6:  
Preparation of Bio-Diesel.

Exercise 7:  
Determination of temporary and permanent hardness of water using standard EDTA solution.

Exercise 8:  
Determination of Copper using standard EDTA solution.

Exercise 9:  
Determination of Iron by a Colorimetric method using thiocynate as reagent.

Exercise 10:  
Determination of pH of the given sample solution using pH meter.

Exercise 11:  
Conduct metric titration between strong acid and strong base.

Exercise 12:  
Conduct metric titration between strong acid and weak base.

Exercise 13:  
Potentiometric titration between strong acid and strong base.

Exercise 14:  
Potentiometric titration between strong acid and weak base.

Exercise 15:  
Determination of Zinc using standard EDTA solution.

Exercise 16:  
Determination of Vitamin – C.

Reference Books:  
COMPUTER PROGRAMMING LAB
(Common to all branches)

I Semester

Course Code: 171ES1L01

Course Objectives:

COB 1: To impart knowledge on various Editors.
COB 2: To nurture the students on various operators and control structures in C.
COB 3: To demonstrate the modular programming approach for solving problems.
COB 4: To make the students understand, the concepts of array and structures.
COB 5: To explain the file concepts for solving various problems.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Implement basic programs in C.
CO 2: Use Conditional and Iterative statements to solve real time scenarios in C.
CO 3: Implement the concept of Arrays and Modularity.
CO 4: Apply the Dynamic Memory Allocation functions using pointers.
CO 5: Develop programs using structures, and Files.

Mapping of Course Outcomes with Program Outcomes:

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<tr>
<td>CO5 (K3)</td>
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</tbody>
</table>

Exercise – 1:
Introduction to C Programming
1.1) Introduction about Editors – Turbo, vi, Emacs
1.2) C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers from Command line
1.3) Write a C Program to Calculate area of a Triangle using Heron's formula.
**Exercise – 2:**

**Basic Math**

2.1) Write a C Program to Find Whether the Given Year is a Leap Year or not.
2.2) Write a C Program to convert Celsius to Fahrenheit and vice versa.
2.3) Write a C Program to find largest of three numbers using ternary operator.

**Exercise – 3:**

**Control Flow - I**

3.1) Write a C program to find the roots of a Quadratic Equation.
3.2) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case.
3.3) Scenario - 1 ATM PIN GENERATION:
Aditya purchased a credit card. He has to generate a PIN number to access the ATM and Net banking for which OTP was sent to his registered mobile number. Using this OTP number he has to generate ATM PIN number. After generating PIN number, he can use it for further transactions. Maximum login he can make is 3 times.
Sample Input:
OTP: 6732
If valid
Enter PIN: 8858
Confirm your PIN: 8858
Sample output:
valid/ Invalid
PIN generated successfully.
Note: OTP is hard coded.
3.4) Scenario - 2 RESET PASSWORD:
Sindhuja was using Syndicate Bank’s Online Account. She wanted to pay her bills through Online. But she forget her password. Now she has to reset the password. For resetting the password, she has to select reset option from the Menu.
NOTE: using switch case.
Sample input:
1. Fast withdrawal
3. Balance Enquiry
4. Reset Password
Enter your choice: 4
Sample Output: Reset password: New password: ***** Confirm password: *****

**Exercise – 4:**

**Control Flow - II**

4.1) Write a C Program to Find Whether the Given Number is
i) Prime Number
ii) Armstrong Number
4.2) Write a C program to print Floyd Triangle
4.3) Write a C Program to print Pascal Triangle
**Exercise – 5:**

**Control Flow – III**

5.1) Write a C program to find the sum of individual digits of a positive integer.
5.2) Write a C program to check whether given number is palindrome or not.
5.3) Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression $1+x+x^2 +x^3 + \ldots +x^n$.
5.4) Scenario - 3 Student Attendance report Generation:

Some of the school staff had failed to maintain the attendance of the students, causing lack of essential records related to students attendance that should be submitted in a parents meet. The school management has decided to automate the process in order to maintain the attendance of every student effectively. You are asked to write a program to the above scenario and display whether the student is allowed to write the Exam or not.

<table>
<thead>
<tr>
<th>percentage&lt;65</th>
<th>detained</th>
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<tr>
<td>&gt;=65 and &lt;75</td>
<td>should pay condonation to appear for Exams</td>
</tr>
<tr>
<td>&gt;=75</td>
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</table>

Sample Input:
Enter no of students: 5
Enter Students Details:

<table>
<thead>
<tr>
<th>Rno:1</th>
<th>Name: Kalyan</th>
<th>attendance(%):67</th>
<th>Should pay condonation to appear for Exams</th>
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<tbody>
<tr>
<td>Rno:2</td>
<td>Name: laxman</td>
<td>attendance(%):56</td>
<td></td>
</tr>
<tr>
<td>Rno:3</td>
<td>Name: Yamini</td>
<td>attendance(%):79</td>
<td></td>
</tr>
<tr>
<td>Rno:4</td>
<td>Name: Aryan</td>
<td>attendance(%):60</td>
<td></td>
</tr>
<tr>
<td>Rno:5</td>
<td>Name: Raghav</td>
<td>attendance(%):88</td>
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</table>

Sample Output:

<table>
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<th>Rno</th>
<th>Name</th>
<th>Attendance (%)</th>
<th>Remarks</th>
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<td>1</td>
<td>Kalyan</td>
<td>67</td>
<td>should pay condonation to appear for Exams</td>
</tr>
<tr>
<td>2</td>
<td>Laxman</td>
<td>56</td>
<td>detained</td>
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<td>Yamini</td>
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<tr>
<td>4</td>
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<tr>
<td>5</td>
<td>Raghav</td>
<td>88</td>
<td>allowed for Exams</td>
</tr>
</tbody>
</table>

**Exercise 6:**

**Arrays**

Demonstration of arrays

6.1) Linear Search.
6.2) Bubble Sort.
6.3) Operations on Matrix.
6.4) Scenario – 4 Celebrity of the Week:

Red FM has launched a program called Celebrity of the week in their channel. Listeners are given a toll free number where they can listen to list of celebrities. Listeners can choose their favourite celebrity from the list and vote for him/her. The votes are validated from Monday to Saturday. The one with highest votes is called as "Celebrity of the Week"
and his/her songs are played in the program, which is aired on Sundays. Now write a program to find the celebrity of the week.

Sample Input:
1. Nagachaithanya
2. Nithin
3. Prabhas
4. Ram
5. Thamanna
6. Samantha
7. Regina
8. Sruthihasan

Enter no of listeners: 10
Enter your favourite: 3
Enter your favourite: 8
Enter your favourite: 4
Enter your favourite: 3
Enter your favourite: 4
Enter your favourite: 2
Enter your favourite: 7
Enter your favourite: 3
Enter your favourite: 1
Enter your favourite: 5

Sample Output:
"Celebrity of the Week" is PRABHAS

Exercise – 7:

Functions
7.1) Write a C Program to demonstrate of parameter passing in Functions and returning values.
7.2) Write a C Program to find Fibonacci, Factorial of a number with Recursion and without Recursion.
7.3) Scenario – 5 SELF DRIVE RENTAL
Sadiq and his friends are going to Bangalore. But they don’t have a vehicle in Bangalore. For that they go to rental cars to take car for rent. You have find out what is total amount of car’s rent. The car’s rentals and rules are as follows.
i) Minimum booking is 4.
ii) There are 3 types of cars
A) SWIFT
B) SCORPIO
C) INNOVA
iii) There are 3 categories in cars rental

A) LTTE
B) CLASS
C) XL
FOR SWIFT,
- In LTTE 5 kms are free for one hour and Rs.70 per one hour, if they exceed 5kmph, then Rs.12 per km.
- In CLASS, 10 kms are free for one hour and Rs.90 per one hour, if they exceed 10kmph, then Rs.12 per km.
• In XL, 15 kms are free for one hour and Rs.110 per one hour, if they exceed 15kmph, then Rs.12 per km.

FOR SCORPIO,
• In LTTE, 5 kms are free for one hour and Rs.90 per one hour, if they exceed 5kmph, then Rs.18 per km.
• In CLASS, 10 kms are free for one hour and Rs.110 per one hour, if they exceed 10kmph, then Rs.15 per km.
• In XL, 15 kms are free for one hour and Rs.130 per one hour, if they exceed 15kmph, then Rs.15 per km.

FOR INNOVA
• In LTTE, 5 kms are free for one hour and Rs.110 per one hour, if they exceed 5kmph, then Rs.18 per km.
• In CLASS, 10 kms are free for one hour and Rs.130 per one hour, if they exceed 10kmph, then Rs.18 per km.
• In XL, 15 kms are free for one hour and Rs.150 per one hour, if they exceed 15kmph, then Rs.18 per km.

SAMPLE INPUT:
ENTER NO.OF DAYS AND HOURS FOR CAR: 01 02 (I.E 1 DAY 2 HOURS = 26 HOURS)
1. SWIFT
2. SCORPIO
3. INNOVA
SELECT A CAR: 2
1. LTTE
2. CLASS
3. XL
SELECT RENTAL TYPE: 2
TOTAL KMS COVERED: 300

SAMPLE OUTPUT:

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<tr>
<th>TOTAL HOURS:</th>
<th>26</th>
</tr>
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<tbody>
<tr>
<td>CAR NAME:</td>
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<tr>
<td>RENTAL TYPE:</td>
<td>CLASS</td>
</tr>
<tr>
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<td>GRAND TOTAL:</td>
<td>3460</td>
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</table>

Exercise – 8:
Strings
8.1) Implementation of string manipulation operations with library function.
i) copy
ii) concatenate
iii) length
iv) compare

8.2) Implementation of string manipulation operations without library function.
i) copy
ii) concatenate
iii) length
iv) compare
8.3) Verify whether the given string is a palindrome or not
8.4) Scenario – 6 Word with Obesity:
Jeeth is a fun loving and active boy. He likes to play with words and numbers. One day
Jeeth and his friends attended a seminar, which was conducted in his school. The Seminar
was about “Causes of obesity in children and its effects”. Jeeth and his friend Ram are not
interested in listening to the seminar, so he thought of giving a puzzle to Ram. Jeeth gave
some words to Ram and wanted him to find the word with Obesity. Ram was confused
and asking your help. Write a program to find the weights of the words and display the
word with highest weight (word with obesity).

Sample Input:
Enter no of words: 3
Enter 3 words: apple banana carrot

Sample Output:
Word with Obesity is carrot

Exercise – 9:
Arrays and Pointers
9.1) Write a C Program to Access Elements of an Array Using Pointer
9.2) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 10:
Dynamic Memory Allocations

10.1) Write a C program to find sum of n elements entered by user. To perform this
program, allocate memory dynamically using malloc() function.
10.2) Write a C program to find sum of n elements entered by user. To perform this
program, allocate memory dynamically using calloc() function. Understand the difference
between the above two programs

Exercises – 11:
Structures
11.1) Write a C Program to Store Information of a book Using Structure
11.2) Write a C Program to Store Information Using Structures with Dynamically
Memory Allocation
11.3) Write a C Program to Add Two Complex Numbers by Passing Structure to a
Function
11.4) Scenario – 7 Library Management
Shilpa student of PGEC got the Library Card. She wants to lend the books from the
Library. The college gave two cards to each and every student. The students can lend only
two books at a time and it has to be returned back after 15 days. If the books are not
returned late fee will be collected for no. of days the books were returned after the due
date. Late fee per day is Rs.50/-
Sample Input.
Enter the name of student, Roll No. Branch, Section, Year, DOL, DOR,
Sample output
No. of days returned after the due date = 5
Late fee per day = Rs. 50
Fine paid by the student is 5 * 50 = 250.

**Exercise -12:**

**Files**
12.1) Write a C program to open a file and to print the contents of the file on screen.
12.2) Write a C program to copy content of one file to another file.
12.3) Write a C program to merge two files and store content in another file.
12.4) Scenario – 8 Student Information System Using Files:
Lakshya International school was recently established and having large no of admissions. The school management wanted the Student information to be computerized and wanted to maintain in a simple and in effective manner. You are asked to develop Student Information System using Files to perform the following tasks
1. Add New Student
2. Update Existing Student
3. Delete Existing Student
4. Retrieve A Particular/All Students

Sample Input:
Choose the task you want to perform:
1. Add
2. Update
3. Delete
4. Retrieve
Your choice: 1
Enter student details:
Name: Akhil
Age: 5
Class: 1

Sample Output:
Student details added

**Reference Books:**
1. Let Us C by Yashwanth Kanetkar.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

**Web Links:**
1. https://www.hackerrank.com/

****
ENGLISH – II
(Common to all branches)

II Semester
Course Code: 171HS2T03

Introduction:
In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

Course Objectives:
COB 1: To improve the language proficiency of the students in English with emphasis on LSRW skills.
COB 2: To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
COB 3: To develop the communication skills of the students in both formal and informal situations.
COB 4: To make the learner understand how modern life has been shaped by Technology.
COB 5: To make the students understand the importance of work.

LISTENING SKILLS:
Objectives:
1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:
Objectives:
1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3 To help the students describe objects, situations and people.
4 To make the students participate in group activities like role-plays, discussions and debates.
5 To make the students participate in Just a Minute talks.

READING SKILLS:
Objectives:

1 To enable the students to comprehend a text through silent reading.
2 To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3 To enable the students to skim and scan a text.
4 To enable the students to identify the topic sentence.
5 To enable the students to identify discourse features.
6 To enable the students to make intensive and extensive reading.

WRITING SKILLS:
Objectives:

1 To make the students understand that writing is an exact formal skills.
2 To enable the students to write sentences and paragraphs.
3 To make the students identify and use appropriate vocabulary.
4 To enable the students capable of note-making.
5 To make the students to write formal and informal letters.
6 To enable the students to write CV
7 To enable the students to write technical reports.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Compare the difference between modern technology and people’s technology.
CO 2: Identify the causes for climate change.
CO 3: Explain the applications of modern technologies.
CO 4: Infer that spiritual help is the true bias of all activities in life.
CO 5: Identify professional work habits, necessary for effective collaboration and cooperation.
CO 6: Rephrase coherent writing in political, social and religious background.
CO 7: Demonstrate writing and basic concepts of grammar skills.

Mapping of Course Outcomes with Program Outcomes:

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Methodology:

1. The class is to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Recommended Topics:

UNIT-I:
1. TECHNOLOGY WITH A HUMAN FACE (Detailed)
2. AN IDEAL FAMILY (Non-Detailed)

UNIT-II:
1. CLIMATE CHANGE AND HUMAN STRATEGY (Detailed)
2. WAR (Non-Detailed)

UNIT-III:
1. EMERGING TECHNOLOGIES (Detailed)
2. THE VERGER (Non-Detailed)

UNIT-IV:
1. THE SECRET OF WORK (Detailed)
2. THE SCARECROW (Non-Detailed)

UNIT-V:
1. WORK BRINGS SOLACE (Detailed)
2. A VILLAGE LOST TO THE NATION (Non-Detailed)

Prescribed Text Books:
**Detailed Text Book:** ‘Sure Outcomes’ by Orient Black Swan Pvt. Ltd. Publishers.

**Non Detailed Text Book:** Panorama- A course on Reading by Oxford University Press Pvt. Ltd. Publishers.
Web Links:

***
MATHEMATICS-II
(Common to CE, EEE, ME, Min.E, PT & Ag.E)

II Semester
Course Code: 171BS2T02

Course Objectives:
COB 1: To equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
COB 2: To help the students acquire a necessary base to develop analytical and design skills.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Apply various numerical methods to find roots of equations and interpolating polynomials.
CO 2: Apply numerical methods to initial value problems and problems involving integration.
CO 3: Find the Fourier series of a given function and study the convergence of the series.
CO 4: Find the Fourier transforms for given functions.
CO 5: Apply method of separation of variables to solve one dimensional heat equation and wave equation and two dimensional laplace equations.

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UNIT I:
Solution of Algebraic and Transcendental Equations and Interpolation:
UNIT II:
Numerical Integration and solution of Ordinary Differential equations:

UNIT III:
Fourier Series:
Fourier series of periodic function - Dirichlet’s conditions for Fourier expansion - Functions having points of discontinuities–Change of interval – Even and odd functions – Half-range series.

UNIT IV:
Fourier Transforms:

UNIT V:
Applications of Partial Differential Equations:
Classification of Higher order P.D.E - Method of separation of Variables- Solution of One dimensional Wave equation, Heat equation and two-dimensional Laplace equation.

Text Books:

Reference Books:
1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
5. Advance engineering mathematics by SRK Iyengar, Alpha Sciences International Publication.

Web Links:
3. https://www.khanacademy.org
4. http://nptel.ac.in/courses/122104017

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MATHEMATICS-III
(Common to all branches)

II Semester
Course Code: 171BS2T06

<table>
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Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Compute Laplace transform of various functions.
CO 2: Apply Laplace transform to solve initial value problems.
CO 3: Discuss about beta and gamma function, double integral over a region and triple integral over a volume.
CO 4: Find the gradient of a scalar function, divergence and curl of a vector function.
CO 5: Apply line, surface and volume integrals to find work done by a force, flux.

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UNIT - I:
Laplace transforms:
Laplace transforms of standard functions–First Shifting theorem, Change of scale, Multiplication with t, Division by t - Transforms of derivatives and integrals – Unit step function –Dirac’s delta function, Periodic functions.
UNIT - II:
**Inverse Laplace transforms:**
Inverse Laplace transforms – Convolution theorem (without proof), Second shifting theorem.
*(MATLAB Exercise: Computing Laplace transform off (t) using symbolic toolbox, Solving initial value problems using ‘dsolve’)*

**Applications:**
Evaluating improper integrals, solving initial value problems using Laplace transforms.

UNIT - III:
**Multiple integrals and Beta, Gamma functions:**
Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration, Beta and Gamma functions- Properties - Relation between Beta and Gamma functions-

**Applications:**
Finding Areas and Volumes.

UNIT - IV:
**Vector Differentiation:**
Gradient - Directional Derivatives - Divergence- Curl - Laplacian operator - Vector identities.

**Applications:**
Equation of continuity, potential surfaces

UNIT - V:
**Vector Integration:**
Line integral – Work done - Surface and volume integrals, Green’s Theorem, Stokes Theorem and Gauss Divergence theorem (without proof) and related problems.

Text Books:
2. Dr. T K V Iyengar, Engineering Mathematics, S. Chand Publications.

Reference Books:

Web Links:
3. https://www.khanacademy.org
4. http://nptel.ac.in/courses/122104017

****
ENGINEERING PHYSICS  
(Common to CE, ME, Min.E, PT & Ag.E)

II Semester  
Course Code: 171BS2T07  
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Course Objectives:
COB 1:  To equip the students with basic knowledge of physics in the areas of optics and lasers.  
COB 2:  To impart the basic knowledge of sound and material science.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1:  Make use of the basic concepts of interference and relate to the principle of interferometer.  
CO 2:  Relate the basic concepts of diffraction to illustrate the principle of optical instruments like Telescope & microscope.  
CO 3:  Explain the basic concepts of polarization, principle of polarimeter and the method of producing high intensity light beams.  
CO 4:  Explain the basic concepts of sound waves, ultrasonics, crystal structure and X-ray diffraction Techniques.  
CO 5:  Classify different types of solids, to use the appropriate solid as per its magnetic and dielectric properties.

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UNIT-I:  
Interference:  
Principle of Superposition – Coherence – Interference in thin films (reflection geometry)—Newton’s rings – construction and basic principle of Interferometer.

UNIT-II:  
Diffraction:  
Fraunhofer diffraction at single slit - Cases of double slit, N-slits, & circular aperture, Grating equation – Rayleigh criterion of resolving power-Resolving power of a grating, Telescope and Microscopes.
UNIT-III:
Polarization:
Types of Polarization-production - Nicol Prism -Quarter wave plate and Half Wave plate-working principle of polarimeter (Sacharimeter)
Lasers:

UNIT-IV:
Acoustics:
Reverberation time - Sabine’s formula – Acoustics of concert-hall.
Ultrasonics:
Production - Ultrasonic transducers- Non-Destructive Testing-Applications.
Crystallography & x-ray diffraction:
Basis and lattice – Crystal Systems – Bravais Lattice - Symmetry elements- Unit cell-packing fraction – coordination number- Miller indices – Separation between successive (h k l) planes – Bragg’s law-Bragg’s x-ray spectrometer.

UNIT-V:
Magnetism:
Classification based on Field, Temperature and order/disorder – atomic origin – Ferromagnetism- Hysteresis- applications of magnetic materials (Para &Ferro).
Dielectrics:

Text Books:
1. Engineering Physics – by M. N. Avadhanulu and T.V.S. Arun Murthy, S. Chand & Company Ltd.,

Reference books:

Web Links:
1. http://nptel.ac.in/courses/122107035/11
2. http://nptel.ac.in/courses/115102023/
5. https://sites.google.com/site/physicsbysureshsaganti/home

****
ENGINEERING DRAWING
(Common to CE, EEE, ME, Min.E, PT & Ag.E)

II Semester

Course Code: 171ES2T03

Course Objectives:

COB 1: To impart the knowledge for drawing various types of polygons, conic sections and scales.

COB 2: To improve the visualization skills of the students for representing the 3D objects in 2D planes.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Sketch the polygons, conics and scales by using the principles of drawing.

CO 2: Draw Orthographic projections of points and lines.

CO 3: Draw Orthographic projections of planes in various positions.

CO 4: Draw Orthographic projections of solids in various positions.

CO 5: Construct isometric scale and isometric projections.

CO 6: Convert isometric view in to orthographic views.

Mapping of Course Outcomes with Program Outcomes:

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UNIT-I

Introduction to Engineering Drawing:
Lettering, Dimensioning, Types of lines.

Geometrical Constructions:
Construction of regular polygons by general method and inscribing circle method. Special methods for pentagon and hexagon.
Conic Sections:
Ellipse, Parabola and Hyperbola by general method (eccentricity method) and special methods.

Scales:
Plain Scale, Diagonal Scale and Vernier Scales.

UNIT-II
Orthographic Projections:
Introduction to orthographic projections, Projections of Points, Projections of Lines.

UNIT-III
Projections of Planes:
Regular planes perpendicular/parallel to one reference plane and inclined to other reference plane; inclined to both the reference planes.

UNIT-IV
Projections of Solids:
Prisms, Pyramids, Cones and Cylinders with the axis parallel to both the reference planes and axis inclined to one of the reference planes.

UNIT-V
Isometric Projections
Isometric Scale, Isometric Projections, Conversion of Isometric views into Orthographic projections.

Text Books:

Reference Books:

Web Links:
1. http://nptel.ac.in/courses/112103019

****
BASIC MECHANICAL ENGINEERING  
(Only CE)

II Semester

Course Code: 171ES2T04

Course Objectives:

COB 1: To define the basic concepts of various mechanical systems and the manufacturing systems.

COB 2: To demonstrate the concepts of boilers, I.C. engines, compressors and transmission systems.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Compare the different types of boilers.

CO 2: Interpret different manufacturing methods.

CO 3: Explain the working of air compressors and the concept of refrigeration.

CO 4: Explain the working principle of Internal Combustion Engines and their performance.

CO 5: Compute the parameters of mechanical components for power transmission.

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UNIT –I:
Steam boilers:
Classification of boilers, essentialities of boilers, selection of different types of boilers, (Babcock and Wilcox, locomotive, lamont) study of boilers, boiler mountings and accessories.
UNIT-II:
**Metal joining:**
arc welding, gas welding, brazing and soldering.

**Metal forming:** forging – operations, rolling and extrusion principles.

**Machine tools:** lathe classification, specifications, and operations.

**Casting:** Steps involved in making a casting – Advantages and applications. –Patterns and Pattern making.

UNIT-III:
**Reciprocating and rotary air compressors:**
uses of compressed air, types, working principle, work done, simple problems.
Refrigeration: concepts, principle of refrigeration and types of refrigeration

UNIT-IV:
**Internal combustion engines:**
classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

UNIT-V:
**Belt and ropes:**
Belt and ropes drives, velocity ratio, slip, length of belt, open belt and cross belt drives, ratio of friction tensions, centrifugal tension in a belt, power transmitted by belts and ropes, initial tensions in the belt, simple problems. Comparison of belt drives with gear drives.

Text Books:

Reference Books:

Web Links:
1. http://nptel.ac.in/courses/112107216/9
7. https://www.youtube.com/watch?v=zKA4TYMgiqU

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ENGLISH COMMUNICATION SKILLS LAB - II
(Common to all branches)

II Semester

Course Code: 171HS2L02

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Course Objectives:

COB 1: To facilitate computer-aided multi-media instruction enabling individualized and independent language learning.

COB 2: To improve the fluency in spoken English and neutralize mother tongue Influence.

COB 3: To train students to use language appropriately

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Illustrate interpersonal skills using language confidently and effectively for personal and profession growth.

CO 2: Make use of effective delivery strategies to select, compile, and synthesize information for an oral presentation.

CO 3: Demonstrate in mock interviews, mock group discussion and public speaking.

CO 4: Identify communicative competency to respond to others in different situations.

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PRACTICE 1: Body Language

PRACTICE 2: Dialogues

PRACTICE 3: Presentation Skills
PRACTICE 4:
Group Discussion

PRACTICE 5:
Interviews and Telephonic Interviews.

PRACTICE 6:
Debates

Reference Books:
1. Strengthen your Communication Skills by Dr. M. Hari Prasad, Dr. Salivendra J. Raju and Dr. G. Suvarna Lakshmi, Maruthi Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. A Handbook of English for Professionals by Prof Eliah, B.S Publications.
5. Cornerstone, Developing soft skills, Pearson Education.

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ENGINEERING PHYSICS LAB  
(Common to CE, ME, Min.E, PT & Ag.E)

II Semester

Course Code: 171BS2L02

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Course Objectives:

COB 1: To make the students gain practical knowledge to co-relate with the theoretical studies.

COB 2: To impart skills in measurements.

COB 3: To plan the experimental procedure and to record and process the results.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Use spectrometer, polarimeter, travelling microscope for making measurements.

CO 2: Determine energy gap of a semiconductor, draw characteristic curves to estimate thermal coefficient of a thermistor, zener diode.

CO 3: Determine the rigidity and determine frequency of an unknown electric vibrator.

CO 4: Determine wavelength of unknown source, the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements.

CO 5: Verify magnetic field along the axis of a circular coil.

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LIST OF EXPERIMENTS:
(Any 10 of the following listed experiments)

3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Verification of laws of vibrations in stretched strings – Sonometer.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus.
15. Hall Effect in semiconductors.
18. Determination of Young’s modulus by method of single cantilever oscillations.
20. Determination of Planck’s constant using photocell.

Reference Books:
2. Laboratory Manual Cum Record for Engineering Physics I & II by Dr.Y.Aparna, Dr.K.Venkateswar Rao, VGS Technoseries.

****
ENGINEERING WORKSHOP AND IT WORKSHOP  
(Common to all branches)

II Semester  
Course Code: 171ES2L02  

ENGINEERING WORKSHOP  
Course Objectives:

COB 1: To impart hands-on practice on basic engineering trades and skills.
COB 2: To nurture the students to be able to build various joints used in different trades used for various domestic and Industrial applications.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Construct the various wooden joints.
CO 2: Prepare the various fitting joints.
CO 3: Experiment with different shapes by black smithy.
CO 4: Develop components for making the various sheet metal models.
CO 5: Experiment with the various house wiring connections.

Mapping of Course Outcomes with Program Outcomes:

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Trade:

Carpentry:
1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

Fitting:
1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit
Black Smithy:
1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring:
1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy:
1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

Reference Books:

IT WORKSHOP

Course Objectives:
COB 1: To nurture the students to identify the basic components of a computer.
COB 2: To demonstrate the process of assembling and disassembling of computer parts.
COB 3: To explain the installation of operating systems.
COB 4: To make the students develop applications like spread sheet, documents, presentation using the software like MS office, LATEX.
COB 5: To illustrate the usage of internet.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Identify various components and its functions.
CO 2: Apply the knowledge of computer peripherals in assembling, disassembling and troubleshooting of personal computer.
CO 3: Experiment with installation of operating system and make the computer ready to use.
CO 4: Prepare word documents, excel sheets and power point presentation.
CO 5: Develop LaTeX documents to handling equations and images effectively.
CO 6: Make use of internet to enhance their technical skills.
Mapping of Course Outcomes with Program Outcomes:

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Exercise 1: Identification of peripherals of a computer
Block diagram of the CPU along with the configuration of the each peripheral and its functions.

Exercise 2: System Assembling and Disassembling
Disassembling the components of a PC and assemble them back to working condition.

Exercise 3: Installation of softwares
Installation of operating Systems: Windows, Linux along with necessary Device Drivers, Installation of application softwares and Tools.

Exercise 4: Troubleshooting (Demonstration)
Hardware Troubleshooting: Identification of a problem and fixing a defective PC Software Troubleshooting: Identification of a problem and fixing the PC for any software issues.

Exercise 5: Network Configuration and Internet
Configuring TCP/IP, proxy and firewall settings, Internet and World Wide Web-Search Engines, Types of search engines, netiquette, cyber hygiene.

Exercise 6: MS-Office / Open Office
b. Spread Sheet - organize data, usage of formula, graphs and charts.
c. Power point - features of power point, guidelines for preparing an effective Presentation.
d. Access- creation of database, validate data.

Exercise 7: LaTeX
LaTeX - basic formatting, handling equations and images.
Reference Books:

6. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech.
7. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

Web Links:

1. https://assembleyourpc.net
2. https://lifehacker.com

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PROBABILITY AND STATISTICS
(Common to CE& Min.E)

III SEMESTER

Course Code: 171BS3T10

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Course Objectives:

COB 1: To acquaint students with the fundamental concepts of probability and statistics

COB 2: To develop an understanding of the role of statistics in Science and Engineering.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Apply various Probability distributions for both discrete and continuous random variables.

CO 2: Compute mean and variance of sample means with replacement and without replacement.

CO 3: Apply various tests to test the hypothesis concerning mean, Proportion, variance and perform ANOVA test.

CO 4: Apply the concepts of correlation and regression to the given statistical data.

CO 5: Examine quality of the product using control charts.

Mapping of Course Outcomes with Program Outcomes:

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UNIT I: Random variables and Distributions

UNIT II: Sampling Theory
Introduction - Population and samples- Sampling distribution of means (known and unknown), proportion, sampling distribution of sums and difference-Central limit theorem- Point and interval estimation for means and proportions.
UNIT III: Tests of Hypothesis

UNIT IV: Correlation and Regression
Introduction – Simple correlation – properties - Pearson and rank correlation Regression – straight line and quadratic curve by method of least squares.

UNIT V: Statistical Quality Control Methods

Text Books:
2. Probability, Statistics and Random processes, T.B.Veeraju, TMH

Reference Books:
2. Introduction to probability and statistics, William Menden Hall, Robert J. Bever and Barbara Bever, Cengage learning, 2009

Web Links:
1. http://nptel.ac.in/courses/111105041/1

****
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING  
(Common to CE & PT)

III Semester

Course Code: 171ES3T05

Course Objectives:

COB 1: To train the students on basic principles of Networks.
COB 2: To equip the students with the knowledge of DC Machines and transformers.
COB 3: To equip the students with the knowledge of alternator and 3-Phase induction motors.
COB 4: To enable the students on operation of half wave and full wave rectifiers.
COB 5: To enable the students to study about the operation of PNP and NPN transistors.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Analyze the various electrical networks.
CO 2: Explain the operation of DC Machines.
CO 3: Examine the performance of single-phase transformers.
CO 4: Compare the operation of 3-phase alternators and 3-phase induction motors.
CO 5: Distinguish the operation of half wave and full wave bridge rectifiers.

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UNIT-1: ELECTRICAL CIRCUITS

Basic definitions-Types of network elements-ac and dc independent sources and their V-I relationship- Ohm’s Law, Kirchhoff’s Laws- mesh analysis- inductive networks-Capacitive networks- series- parallel circuits and star-delta and delta-star transformations-basic introduction to ac circuits.
UNIT-2:
DC Machines

UNIT – III: Transformers

UNIT – IV: AC Rotating Machines

UNIT - V: Rectifiers & Transistors
PN junction diodes - diode applications (Half wave and Full wave rectifiers) - PNP and NPN junction transistor - transistor as an amplifier

Text Books:
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI PHI.

Reference Books:
1. Basic Electrical Engineering by M. S. Naidu and S. Kamakshiah, TMH Publications
4. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group

Web Links:
1. http://jntuk-coeerd.in/
3. http://nptel.ac.in/courses/117106101/
4. http://nptel.ac.in/courses/122106025/

****
STRENGTH OF MATERIALS-I

Course Objectives:

COB 1  To impart preliminary concepts of strength of material and principles of elasticity and plasticity, stress strain behavior of materials and their governing laws, the moduli of elasticity and their relations.

COB 2  To teach the basic concepts of bending moment and shear force for beams with different boundary and loading conditions and draw the diagrams of variation across the length.

COB 3  To make the students know the concepts of stresses developed in the cross section and bending equations, calculation of section modulus of sections with different cross sections.

COB 4  To enable the students to calculate slope and deflections in beams under various loading and support conditions.

COB 5  To equip the students with the necessary concepts to classify the cylinders based on their thickness and to derive equations from measurement of stresses across the cross section when subjected to external loading.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1  Explain the behavior of basic materials under the influence of different external loading conditions and the support conditions.

CO 2  Develop the diagrams indicating the variation of the key performance features like bending moment and shear forces.

CO 3  Determine the bending stresses in beams when subjected to bending using flexural equation.

CO 4  Calculate the shear stress occurring in members due to various loading conditions.

CO 5  Analyze the deflections in beams under various loading and support conditions.

CO 6  Determine stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using lame’s equation.

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UNIT I
Simple Stresses and Strains and Strain Energy


UNIT II
Shear Force and Bending Moment
Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT III
Flexural Stresses & Shear Stresses

UNIT IV
Deflection of Beams
Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

UNIT V
Thin and Thick Cylinders
Text Books:

Reference Books:

Web Links:
1. http://nptel.ac.in/courses/105105108/2

****
BUILDING MATERIALS AND CONSTRUCTION

III Semester
Course Code: 171CE3T01

Course Objectives:

COB 1 To enable the students to know the concept of basic building materials and their properties.
COB 2 To make the students to know the classification of aggregates testing of the aggregate.
COB 3 To impart the knowledge on different types of masonry constructions and types of materials used.
COB 4 To equip students with knowledge on formwork and scaffolding.
COB 5 To familiarize the students to know the various patterns of floors, walls, different types of paints and varnishes.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 Explain the sources, properties and applications of common building materials.
CO 2 Demonstrate the properties of different materials and carry out various tests on cement and concrete.
CO 3 Illustrate different constructions of brick and stone masonry.
CO 4 Choose different types of constructions for structural components.
CO 5 Infer the concept of water proofing, damp proofing materials and construction techniques.

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UNIT I
Stones, Bricks and Tiles

UNIT II
Lime and Cement

UNIT III
Masonry and Timber
Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls.

UNIT IV
Building Components
Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, and Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen Post Trusses. R.C.C Roofs, Madras Terrace and Pre-fabricated roofs.

UNIT V
Finishings
Damp Proofing and Water Proofing Materials and uses – Plastering Pointing, white washing and distempering.

Text Books:
Reference Books:

Web Links:
2. http://nptel.ac.in/courses/105102088/
3. https://theconstructor.org/

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SURVEYING

III Semester
Course Code: 171CE3T02

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Course Objectives:

COB 1: To introduce the basic principles of surveying, various methods of linear and angular measuring instruments so as to enable the students to use survey equipment.

COB 2: To familiarize the students with chain, compass, level, theodolite and advanced surveying equipment.

COB 3: To make the students know various methods employed for the measurement of areas and volumes.

COB 4: To enable the students to determine positions of existing features on ground.

COB 5: To equip the students with necessary methods of setting out of simple curves and methods of contours.

COB 6: To develop the plan or map showing the ground features from data obtained by surveying.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the fundamentals of surveying.

CO 2: Solve the difficulties in chain and compass survey.

CO 3: Describe graphical field work to prepare reports.

CO 4: Estimate the levels of existing ground to prepare contour plan.

CO 5: Solve height and distances problems using different principles.

CO 6: Discuss various advanced surveying equipment.

CO 7: Produce layout curves for roads.

CO 8: Calculate regular, irregular areas and volumes.

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UNIT I
Introduction
Definition—uses of surveying—objectives—principles, classifications—divisions, units of measurements, scales, conventional symbols, errors in survey measurements.


UNIT II
Plane table Surveying


UNIT III
Theodolite
Theodolite, description, principles—uses and adjustments—temporary and permanent, measurement of horizontal and vertical angles. Trigonometrical leveling.

Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT IV
Advanced Surveying
Total station, electronic distance measurements (EDM)—principles of electro optical EDM—global positioning system—introduction to geodetic surveying.

Curves: Types of curves, design and setting out simple circular curves by linear and angular methods—introduction to compound curves.

UNIT V
Computation of Areas and Volumes
Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section—determination of the capacity of reservoir, volume of barrow pits.

Text Books:
1. Surveying (Vol No.1, 2 & 3), B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications (P) ltd.
3. Text book of Surveying, C. Venkataramaiah, University press, India (P) limited.
**Reference Books:**

**Web Links:**
1. http://nptel.ac.in/courses/105104101/
3. http://nptel.ac.in/courses/105107158/17
# FLUID MECHANICS

## III Semester

**Course Code:** 171CE3T03

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### Course Objectives:

**COB 1:** To make the students to know fluid properties and their influence on fluid motion and metacentric heights of floating bodies.

**COB 2:** To enable the students to calculate pressure forces on submerged bodies and derive the equation of conservation of mass and its application.

**COB 3:** To impart the students with knowledge on continuity equation and Bernoulli’s equation to solve problems as well as to derive formulae for flow measuring devices.

**COB 4:** To enable the students to learn laminar, turbulent flows and losses in pipes.

**COB 5:** To make the student to study in detail about boundary layer theory.

### Course Outcomes:

At the end of the Course, Student will be able to:

**CO 1:** Interpret the importance of fluid properties and their influence on fluid motion.

**CO 2:** Calculate pressure by using manometers and metacentric heights of floating bodies.

**CO 3:** Apply the principles of total pressure and centre of pressure in the design of different components in hydraulic structures.

**CO 4:** Utilize the principles of fluid kinematics in different fluid flow problems.

**CO 5:** Make use of fundamental principles of fluid motion in measurement of flow.

**CO 6:** Apply the basic concepts of laminar, turbulent flow and losses in conduits for solving problems.

**CO 7:** Apply the knowledge of boundary layer theory concept to determine drag force.

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UNIT I
Introduction
Physical properties of fluids - specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, Pascal’s law, variation of static pressure, atmospheric, gauge and vacuum pressures – measurement of pressure by pressure gauges, manometers – differential and micro manometers.
Buoyancy: Buoyancy, stability of submerged bodies and floating bodies, metacentre and metacentric height.

UNIT II
Hydrostatics
Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.
Fluid Kinematics: Methods of describing fluid flow, Stream line, path line, streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flow net.

UNIT III
Fluid Dynamics
Surface and body forces – Euler’s and Bernoulli’s equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.

UNIT IV
Laminar Flow and Turbulent Flows
Reynold’s experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, hydro-dynamically smooth and rough flows.
Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold’s number – Moody’s Chart, Pipe network problems, Hardy-Cross Method.

UNIT V
Boundary Layer Theory
Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations) - BL in transition, separation of BL, Control of BL and flow around submerged objects-Drag and Lift- Magnus effect.

Text Books:
2. Hydraulics and Fluid Mechanics including machines, Dr.P.N.Modi and Dr.S.M.Seth, Rajsons Publications Pvt. Ltd.
Reference Books:
4. Fluid Mechanics including Hydraulic machines, Dr. A.K. Jain, Khanna publishers.

Web Links:
1. http://nptel.ac.in/courses/105103095/
2. https://lecturenotes.in/subject/240/fluid-mechanics
4. https://drive.google.com/file/d/0B-IbNSAhk4D2azFLZnV1M0ZFbkU/view

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SURVEYING LAB

III Semester
Course Code: 171CE3L01

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Course Objectives:

COB 1: To enable the students to determine regular and irregular area from field notes.
COB 2: To help the students to learn to estimate the levels of existing ground and prepare contour plan.
COB 3: To enable the students to measure horizontal, vertical angles and distances.
COB 4: To equip the students with necessary methods of setting out of simple curves and able to prepare contour maps.
COB 5: To enrich the student with advanced surveying equipment like total station.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Develop the plan or map showing the ground features from data obtained by surveying.
CO 2: Develop graphical field work and prepare reports.
CO 3: Estimate the levels of existing ground and prepare contour plan.
CO 4: Solve height and distances problems using different principles.
CO 5: Produce layout curves for roads and computation of areas and volumes.
CO 6: Calculate areas and distances by total station.

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List of field works

WEEK 1: 1. To find the area by chain survey (closed circuit).
WEEK 2: 2. To find the area of the given boundary using compass (closed traverse).
WEEK 3: 3. To find the area of given boundary by method of radiation (plane table survey).
WEEK 4: 4. To find the level difference by height of instrument method or rise and fall method (differential leveling).

WEEK 5: 5. To find the level difference along the length of the road (longitudinal section) and draw given road profile (fly leveling).


WEEK 7: 7. To find the distance between two inaccessible points by theodolite survey & the height and distance problem (Trigonometric leveling).

WEEK 8: 8. To find Height and distance problems using Tacheometric principles (Tacheometric survey).

WEEK 9: 9. To set out a simple circular curve by linear method.

WEEK 10: 10. To prepare a contour map by grid method.

WEEK 11: 11. To study introduction to total station and practicing, setting up, leveling up, and elimination of parallax error & find the Distance between two inaccessible points and determination of remote height (total station).

WEEK 12: 12. To determine the area using total station.

List of Augmented Experiments: (Week 13 – Week 16)
(Any two of the following experiments can be performed)
13. To find the area of given boundary by method of intersection (plane table survey).
14. To determine the horizontal angles by method of reiteration (theodolite survey).
15. To find the distance between two inaccessible points by compass survey.
16. To find the level difference between two points (simple leveling).
17. To find the Tacheometric constants by tacheometric survey.
18. To prepare a contour map by using total station.

Reference Books:
1. Surveying (Vol No.1, 2 &3), B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications (P) ltd, New Delhi.

Web Links:
2. http://nptel.ac.in/courses/105107122/home.htm
3. http://nptel.ac.in/courses/105107158/20
4. https://onlinecourses.nptel.ac.in/noc18_ce03/unit?unit=38&lesson=42
5. https://onlinecourses.nptel.ac.in/noc18_ce03/unit?unit=46&lesson=52

****
STRENGTH OF MATERIALS LAB

III Semester
Course Code: 171ES3L03

Course Objectives:

COB 1: To enable the students to know the various strength and strain measuring equipments.
COB 2: To equip the students with the knowledge on various physical, mechanical properties and strength of various engineering materials.
COB 3: To impart the knowledge on the basic concepts of hardness of metals by bhn, rockwell and vicker's apparatus.
COB 4: To enable the student to assess impact resistance of materials by charpy & izod tests.
COB 5: To enable the students distinguish between simply supported beam and cantilever beam and determine the young’s modulus of beam material.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Illustrate the stress-strain relationship for mild steel/ hysd bars.
CO 2: Determine modulus of rigidity of spring.
CO 3: Find the hardness of metals by bhn, rockwell &vicker's apparatus.
CO 4: Estimate the impact resistance of materials by charpy & izod tests.
CO 5: Distinguish between simply supported beam and cantilever beam and determine the young’s modulus of beam material.

Mapping of Course Outcomes with Program Outcomes:

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List of Experiments

WEEK 1: 1. To estimates the mechanical properties of Mild Steel specimen under tensile load by Direct Tension.
WEEK 2: 2. To estimate the young’s modulus of simply supported beam.
WEEK 3: 3. To estimate young’s modulus of cantilever beam.
WEEK 4: 4. To determine the Rigidity modulus of mild steel specimen by performing Torsion test.
WEEK 5: 5. To determine the Brinell & Rockwell hardness number of the given specimen.
WEEK 6: 6. To determine the spring properties (stiffness and rigidity modulus) under tensile and compressive loads.
WEEK 7: 7. To find the Compressive strength of given wood or concrete.
WEEK 8: 8. To find the impact strength of mild steel specimen by performing IZOD and Charpy Impact test
WEEK 9: 9. To determine the ultimate shear strength of mild steel specimen test.
WEEK-10: 10. To find the strain of given sample by using electrical resistance strain gauge.
WEEK-11: 11. To determine young’s modulus of different continuous beams.
WEEK-12: 12. To study non destructive testing methods on various materials (Demonstration).

List of Augmented Experiments: (Weeks 13 – Week 16)
(Any two of the following experiments can be performed)
13. To compare compressive strength of clay brick and reinforced cement concrete cube.
14. To verify of Maxwell’s Reciprocal theorem on beams.
15. To perform shear test on given specimen.
16. Leaf spring test (Demonstration).
17. To prepare and study the micro structure of pure metals mild steel, low carbon steel and high carbon steel

Reference Books:

Web links:
1. http://nptel.ac.in/courses/105105108/2
5. http://smec.ac.in/sites/default/files/lab1/Strength%20of%20Materials%20Lab.pdf

*****
PROFESSIONAL ETHICS AND HUMAN VALUES
(Common to all branches)

III Semester
Course Code: 171HS3A09

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<th>Course Objectives:</th>
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<td>COB 2: To paraphrase human rights and quote examples on values and morals.</td>
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<td>COB 3: To infer ethical thinking abilities through experimental learning.</td>
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<td>COB 4: To help an engineer to identify what is wrong and right in engineering profession.</td>
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<td>COB 5: To prepare an engineer personally and professionally with ethics.</td>
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Course Outcomes:
At the end of the Course, Student will be able to:

| CO 1: Make use of values, morals and ethics in their day to day life. |
| CO 2: Identify what is right and wrong through moral ethics. |
| CO 3: Analyze experimental learning while developing the society with ethics. |
| CO 4: Apply ethical principles to resolve the problems that arise in work place. |
| CO 5: Apply adequate knowledge on global code of conduct. |

Mapping of Course Outcomes with Program Outcomes:

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UNIT-I
Human Values:
UNIT-II

Principles for Harmony:

UNIT-III

Engineering Ethics and Social Experimentation:

UNIT-IV

Engineers’ Responsibilities towards Safety and Risk:

UNIT-V

Engineers’ Duties and Rights:

Text Books:
1. A Text Book on professional Ethics and human, R.S.Naagarazan
2. Professional Ethics and human values, M.P.Raghavan’s, Scitech publications India Pvt, 2013.

Reference Books:
2. Human Values And Professional Ethics, Jayshree Suresh and B. S. Raghavan, S.Chand Publications
4. Engineering Ethics Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
Web Links:
1. http://nptel.ac.in/courses/109104068
3. http://nptel.ac.in/courses/109104068/30
4. http://nptel.ac.in/courses/122106031/Pdfs/2_1.pdf
EMPLOYABILITY SKILLS - I
(Common to all branches)

III Semester

Course Code: 171HS3A10

Course Objectives:
COB 1: To provide necessary training to impart employability skills.
COB 2: To ensure the students secure placements.
COB 3: To make the students feel comfortable to face several competitive examinations with confidence and competence.
COB 4: To make the student more likely to be employed.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Identify the number and letter series techniques in different models.
CO 2: Demonstrate the basic grammatical skills.
CO 3: Compare the different types of number and letter analogy models.
CO 4: Transfer the different models of coded elements to decoded elements
CO 5: Ignite creative thinking abilities.
CO 6: Identify the direction and distance of the objects.

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UNIT-I
Aptitude: Number series

Aditya Engineering College (A) 105
UNIT-II
Aptitude: Number Analogy
Soft Skills: Tenses, Voice- Importance - Definitions - usage - rules - types - structures- signal words - examples

UNIT-III
Aptitude: Letter series, Letter Analogy
Soft Skills: Speech Definition - importance - conversion rules - usage - structures - examples

UNIT-IV
Aptitude: Coding & Decoding.
Soft Skills: Creative product speaking, Auxiliaries A. Primary B. Secondary.

UNIT-V
Aptitude: Direction Test.
Soft Skills: Sentences –simple, complex, compound, Sentence Improvement.

Text Books:
1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal, S CHAND
2. Quick Learning Objective General English - Dr. R.S. Aggarwal, S CHAND

Reference books
1. General Intelligence and Test of Reasoning- S CHAND
3. A New Approach to Objective English -R.S. Dhillon DGP Publications

Web Links
1. www.indiabix.com
2. https://www.indianstudyhub.com

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EMPLOYABILITY SKILLS - I
(Revised Syllabus for batches admitted from 2018 - 2019)
/Common to all branches/

III Semester

Course Code: 171HS3A10

Course Objectives:

COB 1: To provide necessary training to impart employability skills.
COB 2: To ensure the students secure placements.
COB 3: To make the students feel comfortable to face several competitive examinations with confidence and competence.
COB 4: To make the student more likely to be employed.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Identify the number and letter series techniques in different models.
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UNIT-I

Aptitude: Number series

UNIT-II
Aptitude: Number Analogy
Soft Skills: Tenses, Voice- Importance - Definitions - usage - rules - types - structures-signal words - examples

UNIT-III
Aptitude: Letter series, Letter Analogy
Soft Skills: Speech Definition - importance - conversion rules - usage - structures - examples

UNIT-IV
Aptitude: Coding & Decoding
Soft Skills: Creative product speaking, Auxiliaries A. Primary B. Secondary

UNIT-V
Aptitude: Direction Test
Soft Skills: Sentences —simple, complex, compound, Sentence Improvement,

Text Books:
1. A Modern Approach to Verbal & Non-Verbal Reasoning- Dr. R.S. Aggarwal, S CHAND
2. Quick Learning Objective General English - Dr. R.S. Aggarwal, S CHAND

Reference books
1. General Intelligence and Test of Reasoning- S CHAND
3. A New Approach to Objective English -R.S. Dhillon   DGP Publications

Web Links
1. www.indiabix.com
2. https://www.indianstudyhub.com

****
Course Objectives:
COB 1: To enable the students to know building byelaws and familiarize national building code.
COB 2: To make the students to study the concept of various building components.
COB 3: To familiarize the students with different sign conventions and different views of a building.
COB 4: To impart the students with the knowledge on the scope of applying principles of planning for both residential and public buildings.
COB 5: To teach the concepts of building drawing in software.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Plan different types of buildings as per NBC regulations and building byelaws.
CO 2: Identify the conventional signs in a master plan.
CO 3: Sketch the various building components.
CO 4: Prepare the plan and various sectional views of simple residential and public buildings.
CO 5: Plan a building in Auto CAD software.

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UNIT I

Building Byelaws and Regulations
Introduction- terminology - objectives of building bye laws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements –
built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.

UNIT II

Residential Buildings
Planning of Residential buildings (living room, dining room, kitchen, bed, bath and water- closets, verandah, store room, worship room, children’s room, study room, guest room, office room, stairs, garage).Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types residential buildings.

UNIT III

Public Buildings
Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

Sign Conventions and Bonds
Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. English bond and Flemish bond -odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT IV

Doors, Windows, Roofs and Stairs
Types of doors: Paneled, framed & paneled door, battened & ledged & braced doors, paneled and glazed door, flush door.
Types of Windows: Paneled window steel window, sash or glazed window.
Types of Roofs: Flat roofs, pitched roof, lean-to-roof, couple roof, closed couple roof, collar roof, king post truss roof, queen post truss, steel roof truss.
Stairs: Classification of stairs.

UNIT V

Computer Aided Building Drawing
CAD Hardware, CAD software, Auto CAD, application of Auto CAD, function keys, AutoCAD screen layout, planning for a drawing, methods to generate building drawings in AutoCAD (absolute coordinate method, relative coordinate method, relative polar coordinate method, direct distance entry method)
Draw the Plan, Elevation and sections of a residential buildings and public buildings from the given line diagram in Sheet & Auto CAD.

Internal Examination pattern
1. The total internal marks (40) are distributed into three components
2. Descriptive (subjective type) weightage 50% examination : 20 Marks
3. Drawing assignment : 10 Marks
4. Computer aided drawing (CAD) assessment : 10 Marks
End semester examination (Total duration 3 hours, Max Marks 60)
PART A: Building planning and drawing [Duration 2 hours: 40 marks]

PART B: Computer lab pattern using any drafting package [Duration 1 hour: 20 marks]

Note: Both PART A and PART B are compulsory and are to be conducted in separate sessions.

Text Books:
1. Building Planning and Drawing, Dr.N.Kumarswamy & KameswaraRao, Charotar Publications.
3. Planning, designing and Scheduling, Gurucharan Singh and Jagadish Singh.

Reference Books:
1. Building by laws, state and Central Governments and Municipal corporations.

Web Links:
1. https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2050
3. https://www.slideshare.net/UrveshDungarani/building-planning-60710633

***
# CONCRETE TECHNOLOGY

## IV Semester

**Course Code:** 171CE4T05  
**Course Code:** 3 1 0 3

### Course Objectives:

- **COB 1:** To teach the students about the properties of ingredients in concrete.
- **COB 2:** To enable the students to study the concrete mix design.
- **COB 3:** To make the students to study the behaviour of concrete as its fresh and hardened state.
- **COB 4:** To impart the students with the knowledge on quality control of concrete.
- **COB 5:** To illustrate the concept of special concrete and their use.

### Course Outcomes:

At the end of the Course, Student will be able to:

- **CO 1:** Demonstrate the basic concepts of concrete.
- **CO 2:** Illustrate the importance of quality of concrete.
- **CO 3:** Discuss the basic ingredients role in the production of concrete.
- **CO 4:** Classify the fresh and the hardened concrete properties.
- **CO 5:** Design the concrete mix by BIS method.
- **CO 6:** Summarise the basic concepts of special concrete.
- **CO 7:** Infer the behaviour of concrete in various environments.

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UNIT I
Ingredients of Concrete cements & Admixtures


UNIT II
Fresh Concrete

UNIT III
Hardened Concrete

UNIT IV
Elasticity, Creep & Shrinkage


UNIT V
Special Concretes
Text Books:

Reference Books:

Web Links:
1. https://nptel.ac.in/courses/105102012
2. www.brighthubengineering.com › Concrete Technology

****
ENGINEERING GEOLOGY

IV Semester

Course Code: 171CE4T06

L T P C
3 1 0 3

Course Objectives:

COB 1: To facilitate the students to examine geomorphic changes occurring in different landforms and importance of geology.

COB 2: To enable the students to identify the physical properties of minerals, rocks and justifying them as useful resource.

COB 3: To impart the students with the knowledge on behaviour of secondary geological structures and stratigraphy of India.

COB 4: To equip the students with necessary information related to occurrence and distribution of groundwater, impact of earthquakes and landslides.

COB 5: To enable the students to explore the surface and subsurface of earth for different geological considerations in constructions of dams, reservoirs and tunnels.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Illustrate weathering process, mass movement and their importance.

CO 2: Distinguish between different petrological formations, rock structures and mineral identification.

CO 3: Differentiate various secondary geological formations.

CO 4: Identify surface, subsurface formations and groundwater potential using geophysical investigation methods.

CO 5: Apply geological principles in natural hazards assessment and selection of sites for dams and tunnels.

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UNIT I
Introduction
Branches of Geology, Importance of Geology in Civil Engineering with case studies. Earth surface features and its internal structure. Weathering and erosion, Geological agents and their work with different rocks and landscapes on earth surface, River development process.

UNIT II
Mineralogy
Definitions of mineral and rock, Different methods of study of minerals and rocks. The Megascopic identification of physical properties of minerals and rocks. Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite.

Petrology
Classification,structures,textures and forms of Igneous rocks, Sedimentary rocks, metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green Etc.). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT III
Structural Geology
Strike, Dip and Outcrop. Study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering. Engineering properties of rocks.

Stratigraphy: Introduction & Formations in India.

UNIT IV
Ground Water
Water table, Cone of depression, Geological controls of Ground Water Movement and types of aquifers, Ground Water Exploration Techniques.

Earthquakes
Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas.

Land Slides
Classification of Landslides, Causes and Effects, measures to be taken to prevent their occurrence at Landslides

UNIT V
Geophysics
Importance, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, radiometric method Etc.,

Geology of Dams, Reservoirs and Tunnels
Types and purpose of Dams, Geological considerations in the selection of a Dam site and Life of Reservoirs. Purpose of Tunneling, effects, Lining of Tunnels. Influence of Geology for successful Tunneling-case studies.
**Text Books:**

**Reference Books:**

**Web Links:**
1. https://nptel.ac.in/courses/105105106/
2. https://sites.google.com/site/3rdsemnotes/engineering-geology

****
HYDRAULICS AND HYDRAULIC MACHINERY

IV Semester

Course Code: 171CE4T07

Course Objectives:

COB 1: To make the student to know open channel flow behaviour.
COB 2: To incorporate the knowledge on gradually and rapidly varied flows and surface profiles.
COB 3: To enable the student to study hydraulic similitude to solve engineering problems.
COB 4: To impart the knowledge on hydraulic machinery such as turbines and pumps.
COB 5: To enable the student to do hydraulic design of turbines.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Illustrate different kinds of flow behaviour in open channel flow.
CO 2: Solve problems on most economical sections, critical depth and specific energy for various channels.
CO 3: Determine length of surface profile and losses in various channels by using dynamic equations of non uniform flows.
CO 4: Apply the knowledge of similitude in hydraulic model testing.
CO 5: Calculate hydrodynamic forces of jets and sketch velocity triangles.
CO 6: Make use of working proportions to do hydraulic design of turbines.
CO 7: Determine performance characteristics of centrifugal and reciprocating pumps.

Mapping of Course Outcomes with Program Outcomes:

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UNIT I
Uniform Flow in Open Channels
Types of channels – Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy’s, and Manning’s formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth.

UNIT II
Non-Uniform Flow in Open Channels
Steady Gradually Varied flow - Dynamic equation, Mild, Critical, Steep, Horizontal and Adverse slopes-surface profiles - direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT III
Hydraulic Similitude
Dimensional analysis - Rayleigh’s method and Buckingham’s pi theorem - study of Hydraulic models – Geometric, kinematic and dynamic similarities - dimensionless numbers – model and prototype relations. 
Impact of Jets Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency - Angular momentum principle.

UNIT IV
Hydraulic Turbines
Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines - surge tanks - unit and specific quantities, selection of turbines, performance characteristics - geometric similarity - cavitation

UNIT V
Centrifugal-Pumps
Reciprocating Pumps: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

Text Books:
3. Hydraulics and Fluid Mechanics including machines, Dr.P.N.Modi and Dr.S.M.Seth, Rajsons Publications Pvt. Ltd.
Reference Books:
5. Fluid Mechanics including Hydraulic machines, Dr. A.K.Jain, Khanna publishers.

Web Links:
1. http://nptel.ac.in/courses/105106114/

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STRENGTH OF MATERIALS-II

IV Semester

Course Code: 171CE4T08

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Course Objectives:

COB 1: To make the students know the preliminary concepts of principal stresses and strains developed in cross section of the beams analytically as well as graphically due to stresses acting on the cross section and stresses on any inclined plane.

COB 2: To teach the basic concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.

COB 3: To enable the students to classify columns and calculation of load carrying capacity using different empirical formulae.

COB 4: To facilitate the students with the concept of combined effect of direct and bending stresses with different engineering structures.

COB 5: To impart the students with the concepts of unsymmetrical bending in beams, location of neutral axis & deflection of beams under unsymmetrical bending.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Calculate the principal stresses developed when subjected to stresses along different axes and design the sections.

CO 2: Determine the effect on springs and shafts when subjected to torsion.

CO 3: Solve the load carrying capacity of columns using different empirical formulae.

CO 4: Determine the combined effect of direct and bending stresses of different engineering structures.

CO 5: Analyze the trusses by using method of joints and method of sections.

CO 6: Analyze the columns when they are subjected to eccentric loading using various theories.

CO 7: Determine the stresses in beams subjected to unsymmetrical bending.

CO 8: Calculate shear centre for channel section, I-section etc.

Mapping of Course Outcomes with Program Outcomes:

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### UNIT I

**Complex Stresses and Theories of Failures**

Introduction – Stresses on an inclined plane under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses-Two perpendicular normal stresses accompanied by a state of simple shear – Principal Stresses and Strains – Mohr's circle of stresses – Analytical and graphical solutions.

**Theories of Failures**

Introduction – Various Theories of failures like Maximum Principal Stress theory – Maximum Principal Strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

### UNIT II

**Torsion of Circular Shafts and Springs**

Theory of pure torsion-Derivation of Torsion equations: \( T/J = q/r = N\phi/L \) – Assumptions made in the theory of pure torsion - Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failures.

**Springs**

Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – carriage or leaf springs.

### UNIT III

**Columns and Plane Frames**


**Analysis of Pin-Jointed Plane Frames**

Determination of Forces in members of plane pin-jointed perfect trusses by (i) method of joints and (ii) method of sections.

### UNIT IV

**Direct and Bending Stresses**

Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.
UNIT V

Unsymmetrical Bending
Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Deflection of beams under unsymmetrical bending.

Shear Centre Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections.

Text Books:

Reference Books:

Web Links:
1. http://nptel.ac.in/courses/105105108/2

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IV Semester
Course Code: 171CE4T09

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Course Objectives:

COB 1: To make the student to know the rudiments of structural analysis, determinate and indeterminate structures, degree of static indeterminacy, significance of compatibility conditions.

COB 2: To impart concepts of bending moment and shear force for different beams with different boundary and loading conditions.

COB 3: To illustrate the procedure for development of slope deflection equations to solve continuous beams with and without settlement of supports.

COB 4: To impart concept of energy theorem for beams and pin jointed trusses and calculate the deflections.

COB 5: To enable the student with the concepts of moving loads and influence lines for assessment of maximum SF and BM at a given section when loads of varying spans rolling loads of pratt and warren trusses.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Differentiate determinate and indeterminate structures.

CO 2: Analyse propped cantilever beams and fixed beams under different loading and support conditions.

CO 3: Analyse continuous beams under different loading and support conditions by theorem of three moments.

CO 4: Analyse continuous beams under different loading and support conditions by slope deflection method.

CO 5: Apply energy theorem for beams and pin jointed trusses and calculate the deflections.

CO 6: Develop the influence line diagrams for various types of moving loads on beams/bridges and trusses.

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UNIT I
Propped Cantilevers
Degree of static indeterminacy- compatibility conditions - Analysis of propped cantilevers with elastic and rigid prop - Shear force and bending moment diagrams - Deflection of propped cantilevers

Fixed Beams: Introduction to statically indeterminate beams with U.D. load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads - shear force and bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support-point of inflexion/contra flexure.

UNIT II
Continuous Beams
Introduction – Clapeyron’s theorem of three moments – Analysis of continuous beams with constant moment of inertia with one or both ends fixed – continuous beams with overhang, continuous beams with different moment of inertia for different spans – Effects of sinking of supports – shear force and bending moment diagrams.

UNIT III
Slope-Deflection Method
Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT IV
Energy Theorems
Introduction-strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castiglino’s first theorem – Deflections of simple beams and pin jointed trusses.

UNIT V
Moving Loads and Influence Lines
Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D. load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load- Focal length.

Influence Lines: Definition of influence line for SF, Influence line for SF, Influence line for BM – load position for maximum SF at a section – Load position for maximum BM at a sections, single point load, U.D. load longer than the span, U.D. load shorter than the span – Influence lines for forces in members, of Pratt and Warren trusses.

Text Books:
Reference Books:

Web Links:
1. http://nptel.ac.in/courses/105101085/
2. https://lecturenotes.in/subject/154/structural-analysis-1

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FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

IV Semester  
Course Code: 171CE4L02

Course Objectives:

COB 1: To verify the principles of channel flow in laboratory by conducting experiments.
COB 2: To make the students know about the various flow measuring devices.
COB 3: To enable the students distinguish the performance characteristics of turbines and pumps.
COB 4: To illustrate concept of coefficient of discharge for different flow conditions.
COB 5: To impart the knowledge on variety of practical fluid flow devices and utilize fluid mechanics principles.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 : Examine the calibration of different flow meters.
CO 2 : Illustrate flow measuring devices used in pipes, channels and tanks.
CO 3 : Determine major and minor losses in pipes.
CO 4 : Analyze energy equation for problems on flow through pipes.
CO 5 : Identify the flow behavior in open channels.
CO 6 : Examine the performance characteristics of turbines and pumps.

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List of Experiments


WEEK-2: 2. To determine the Coefficient of discharge for a small orifice by a constant head method.

WEEK-3: 3. Calibration of contracted Rectangular Notch and /or Triangular Notch.

WEEK-4: 4. To determine the Coefficient of loss of head in a sudden contraction and friction factor.

WEEK-5: 5. To verify the Bernoulli’s equation.

WEEK-6: 6. To study the impact of jet on various vanes.

WEEK-7: 7. To determine the height of jump and head loss in hydraulic jump.

WEEK-8: 8. Performance test on Pelton wheel turbine.


WEEK-10: 10. To conduct efficiency test on centrifugal pump.

WEEK-11: 11. To conduct efficiency test on reciprocating pump.

WEEK-12: 12. Performance test on Kaplan turbine.

List of Augmented Experiments: (Week 13 – Week 16)
(Any 2 experiments to be conducted from the following)
13. To study the flow phenomenon by using Reynolds’s experiment.
15. To determine the metacentric height of a floating body.
16. To determine the Coefficient of discharge for an external mouth piece by variable head method.
17. To measure the velocity at a point by using pitot tube apparatus.

Reference Books:
1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS.

Web Links:
1. http://nptel.ac.in/courses/105106114/

****
CONCRETE TECHNOLOGY LAB

IV Semester
Course Code: 17CE4L03

Course Objectives:

COB 1: To train the students on quality control tests on concrete making materials.
COB 2: To equip the students with the knowledge on conduction of quality control tests on fresh & hardened concrete.
COB 3: To enable the students to design and tests on concrete mix.
COB 4: To make the students to know non-destructive tests on concrete.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Explain the importance of testing of cement and its properties.
CO 2: Examine different properties of aggregates.
CO 3: Determine the workability of concrete.
CO 4: Experiment with the properties of hardened concrete.
CO 5: Demonstrate the non-destructive testing procedures on concrete.

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List of Experiments:

WEEK-1: 1.To find the normal Consistency and fineness of cement.
WEEK-2: 2.To determine the initial setting time and final setting time of cement.
WEEK-3: 3.To find the specific gravity and soundness of cement.
WEEK-4: 4.To determine the compressive strength of cement.
WEEK-5: 5.To determine the grading and fineness modulus of Coarse aggregate by sieve analysis.
WEEK-6: 6.To determine the specific gravity of coarse aggregate.
WEEK-7: 7.To find the grading and fineness modulus of fine aggregate (sand) by sieve analysis.
WEEK-8: 8.To determine the bulking of sand.
WEEK-9: To determine the workability of concrete by compaction factor method.

WEEK-10: To determine the workability of concrete by slump test.

WEEK-11: To determine the workability of concrete by Vee-bee test.

WEEK-12: To find the compressive strength of cement concrete and its young’s modulus.

List of Augmented Experiments:: (Week 13 – Week 16)
(Any 2 experiments to be conducted from the following)

13. To determine the split tensile strength of concrete
14. To study Non-Destructive test on concrete (for demonstration)
15. To determine the split tensile strength of concrete cube
16. To determine the rebound number of concrete using rebound hammer

Reference Books:
2. Properties of Concrete, A.M. Neville, Pearson, 2004
3. Concrete Technology, A.M. Neville and J.J. Brooks, Pearson, 2004

Web Links:

****
INTELLECTUAL PROPERTY RIGHTS AND PATENTS
(Common to CE, CSE, IT, Min.E, PT & Ag.E)

IV Semester
Course Code: 171HS4A08

Course Objectives:

COB 1: To outline and classify intellectual property.
COB 2: To enable the students to study issues relating to an Intellectual Property right.
COB 3: To explain Intellectual Property Law to find out solution in relation to Intellectual Property rights in the interest of original owner of Intellectual Property.
COB 4: To illustrate the Institutions and agencies that grants, protects and works for Intellectual properties in India and abroad.
COB 5: To impart knowledge of Intellectual property rights on trademarks, copyrights and patents.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Compare various Intellectual Property rights.
CO 2: Discuss on Intellectual Property infer rights on such Intellectual Property owners.
CO 4: Interpret the legal issues on Intellectual Property Rights and cyber laws.
CO 5: Apply for trade mark, copyrights, patents.
CO 6: Summarize the ways to protect trade secrets.

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UNIT-I
Introduction to Intellectual Property Rights (IPR):

UNIT –II
Copyrights and Neighboring Rights:

UNIT –III
Patents:

UNIT –IV
Trademarks and Trade secrets:

UNIT –V
Cyber Law and Cyber Crime:
Relevant Cases Shall be dealt where ever necessary.

Text Books:
Reference Books:

Web links:
EMPLOYABILITY SKILLS - II
(Common to all branches)

IV Semester
Course Code: 171HS4A11
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Course Objectives:
COB 1: To provide necessary training to impart employability skills.
COB 2: To ensure the students to secure placements.
COB 3: To make the students to feel comfortable to face several competitive examinations with confidence and competence.
COB 4: To make the student more likely to be employed.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Identify the symbols, notations and Venn-diagrams.
CO 2: Demonstrate the basic grammatical skills.
CO 3: Relate different types of blood relations.
CO 4: Apply the logics in the puzzles and arrangements.
CO 5: Identify the logic in the cubes and dice.
CO 6: Build the typical write-up skills.

Mapping of Course Outcomes with Program Outcomes:

Mapping of Course Outcomes with Program Specific Outcomes:

UNIT-I
Aptitude: Symbols & Notations.
Soft Skills: Subject-Verb Agreement, Personality Development.

UNIT-II
Aptitude: Venn Diagrams, Blood Relations.
Soft Skills: Adjectives, Degree of Comparisons

UNIT-III
Aptitude: Puzzle test, Time and Date (Group Reasoning)
**Soft Skills:** Art of Communication, Words Often Confused

**UNIT-IV**
**Aptitude:** Cubes & Dice
**Soft Skills:** Word Analogy, Effective Listening

**UNIT-V**
**Aptitude:** Seating Arrangements
**Soft Skills:** Paragraph Writing, non-verbal communication

**Text Books:**
2. Quick Learning Objective General English - Dr. R.S. Aggarwal, S.CHAND Publications.

**Reference Books:**
1. General Intelligence and Test of Reasoning, S.CHAND Publications
3. A New Approach to Objective English, R.S. Dhillon DGP Publications.

**Web Links:**
1. www.indiabix.com
2. https://www.indianstudyhub.com

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EMPLOYABILITY SKILLS - II
(Revised Syllabus for batches admitted from 2018-2019)
(Common to all branches)

IV Semester
Course Code: 171HS4A11

Course Objectives:

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UNIT-I

Aptitude: Symbols & Notations.
Soft Skills: Subject-Verb- Agreement, Personality Development.

UNIT-II

Aptitude: Venn Diagrams, Blood Relations.
Soft Skills: Adjectives, Degree of Comparisons
UNIT-III
Aptitude: Puzzle test, Time and Date (Group Reasoning)
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Web Links:
1. www.indiabix.com
2. https://www.indianstudyhub.com

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

IV Semester
Course Code: 171HS4A04

Course Objectives:
COB 1: To equip the students with the basic inputs of managerial economics and demand concepts.
COB 2: To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
COB 3: To impart the knowledge on production theories, its factors and cost analysis.
COB 4: To make the students take optimal decisions and acquiring the knowledge on financial accounting and its analysis.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Explain the Managerial Economic concepts for decision making and forward planning.
CO 2: Illustrate the law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.
CO 3: Identify the cost behavior, costs useful for managerial decision making and Break Even Point (BEP) of an enterprise.
CO 4: Outline the different types of business organizations along with basic knowledge on business cycle.
CO 6: Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making.

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UNIT-I
Introduction to Managerial Economics and Demand Analysis:
Definition of Managerial Economics – Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand - Demand schedule, Demand curve, Law of Demand and its limitations - Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting

UNIT – II
Production and Cost Analyses:
Concept of Production function - Cobb-Douglas Production function – Law of Variable proportions - Isoquants and Isocosts and choice of least cost factor combination - Concepts of Returns to scale and Economies of scale - Different cost concepts: opportunity costs, explicit and implicit costs - Fixed costs, Variable Costs and Total costs – Cost – Volume-Profit analysis - Determination of Breakeven point (simple problems) - Managerial significance and limitations of Breakeven point.

UNIT – III
Introduction to Markets, Pricing Policies &Types of Business Organization and Business Cycles:

UNIT – IV
Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements - Analysis and Interpretation of Financial Statements - Ratio Analysis

UNIT – V
Capital and Capital Budgeting:
Capital Budgeting: Meaning of Capital-Capitalization - Meaning of Capital Budgeting - Time value of money - Methods of appraising Project profitability: Traditional Methods (pay back period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

Reference Books:
Web links:
1. www.managementstudyguide.com
2. www.tutorialspoint.com
3. http://shodhganga.inflibnet.ac.in/bitstream/10603/7277/9/08_chapter%202
MANAGEMENT SCIENCE

V Semester
Course Code: 171HSST05
Course Objectives:

COB 1: To make the students know the principles, functions, theories and practices of different management areas.

COB 2: To equip the students with a systematic and critical understanding of organizational structures.

COB 3: To impart knowledge on conceptual models of strategic management and to familiarize with the tools of operations and project management.

COB 4: To make the students know the role of human relations in the management of operations.

COB 5: To nurture the students with the contemporary practices of management.

Course Outcomes:
At the end of the Course, Student will be able to:

CO1: Apply management and motivation theories to renovate the practice of management.

CO2: Explain concepts of quality management and use process control charts, concepts and tools of quality engineering in the design of products and process controls.

CO3: Appraise the functional management challenges associated with high levels of change in the organizations.

CO4: Identify activities with their interdependency and use scheduling techniques of project management PERT/CPM.

CO5: Develop global vision and management skills both at strategic level and interpersonal level.

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UNIT 1
Introduction to Management:
Concept nature and importance of Management, Generic Functions of Management, and Evaluation of Management thought, Theories of Motivation, Decision making process, Designing organization structure, Principles of organization & Organizational typology.

UNIT 2
Operations Management:
Principles and Types of Management, Work study, Statistical Quality Control, Control charts (P-chart, R-chart, and C-chart) Simple problems, Material Management: Need for Inventory control, EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis), Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma, Supply chain management

UNIT 3
Functional Management:
Concept of HRM, HRD and PMIR, Functions of HR Manager, Wage payment plans(Simple Problems), Job Evaluation and Merit Rating, Marketing Management, Functions of Marketing, Strategies based on product Life Cycle, Channels of distributions.

UNIT 4
Project Management:
Development of Network, Difference between PERT and CPM, Identifying Critical Path, Probability, Project Crashing (Simple Problems).

UNIT 5
Strategic Management:

Text Books:

References Books:
Web Links:
1. www.managementstudyguide.com
2. www.citehr.com
3. www.nptel.ac.in/courses/122106032
4. www.btechguru.com/courses--nptel--basic-course
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

V Semester
Course Code: 171CE5T10

Course Objectives:
COB 1: To familiarize students with different types of design philosophies.
COB 2: To equip students with concepts of design of flexural members.
COB 3: To introduce the concepts of shear, bond and torsion.
COB 4: To enable students to learn different types of compressions members and their design.
COB 5: To make the students study different types of footings, slabs and their design.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Utilize different types of design philosophies.
CO 2: Explain the concept of limit state design and apply it to beams.
CO 3: Design flanged sections subjected to shear, torsion and bond.
CO 4: Design different type of compression members and footings.
CO 5: Design one-way slabs and two-way slabs.
CO 6: Explain the detailing of structural components of building.

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UNIT I
Introduction
Limit State Design
All units i.e. from unit II to unit V are to be taught in Limit State Design.

UNIT II
Design for Flexure
Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity-Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel.
Design for Shear, Torsion and Bond
Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing and Limit state design for serviceability.

UNIT III
Design of Compression members
Effective length of a column, Design of short and long columns – under axial loads, uni-axial bending and biaxial bending – Braced and un-braced columns – I S Code provisions.

UNIT IV
Footings
Different types of footings – Design of isolated and footings - rectangular footings subjected to axial loads, uni-axial and bi-axial bending moments.

UNIT V
Slabs:
Classification of slabs, design of one-way slabs and two - way slabs, using IS Coefficients (conventional).

NOTE: All the designs to be taught in Limit State Method. Following plates should be prepared by the students.
1. Reinforcement detailing of T-beams, L-beams.
2. Reinforcement detailing of columns and isolated footings.
3. Detailing of one-way, two-way slabs.

Internal Examination Pattern
The total internal marks (40) are distributed in three components as follows:
1. Descriptive (subjective type) examination : 24 marks
2. Detailing sheets(For above plates) : 10 marks
3. Assignment : 06 marks
Final Examination Pattern
The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of six questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Text books:

I S Code Books:
2. SP -16.
   (These codes are permitted to use in the examination)

Reference Books:
2. Reinforced Concrete Structures, Park and Pauley, John Wiley and Sons Publishers
3. Design of Reinforced Concrete Structures, Krishna Raju, New Age International.

Web Links:
1. http://nptel.ac.in/courses/105105105/
2. https://lecturenotes.in/subject/167/design-of-concrete-structures-dcs
3. https://www.academia.edu/8007881/Design_of_Concrete_Structures_Notes_1

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TRANSPORTATION ENGINEERING

V Semester  
Course Code: 171CE5T11

Course Objectives:

COB 1: To enable the students to learn various factors affecting road network alignment.
COB 2: To familiarize the students with highway cross section elements.
COB 3: To equip the students with the knowledge on traffic engineering.
COB 4: To enable the students with the concepts of intersections and their design.
COB 5: To familiarize the students with the basic knowledge on railway and airport engineering.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Develop geometric design of transport systems.
CO 2: Design the traffic signalling system.
CO 3: Design highway Intersections.
CO 4: Design of rigid and flexible pavements.
CO 5: Explain the basic concepts of railway and airport engineer.

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UNIT - I
Introduction to Highway Engineering:
Highway Geometric Design:

UNIT - II
Traffic Engineering:

UNIT – III
Intersection Design:
Types of intersections –Conflicts at intersections –Types of at-grade intersections channelization –Objectives –Traffic islands and design criteria –Types of grades – Separated intersections –Rotary intersection –Concept of rotary intersection and design criteria- Advantages and disadvantages of rotary intersection.

UNIT - IV
Design of Pavements:
Types of pavements – Functions and requirements of different components of pavements - Design Factors.
Flexible Pavements:
Rigid Pavements:

UNIT - V
Railway Engineering:
Airport Engineering:
Factors affecting selection of site for airport –Aircraft characteristics –Geometric design of runway –Computation of runway length –Correction for runway length – Orientation of runway –Wind rose diagram.
Text books:

Reference books:

Web Links:
1. http://nptel.ac.in/courses/105101087/29
3. https://ircep.gov.in/

*****
STRUCUTRAL ANALYSIS -II

V Semester

Course Code: 171CE5T12

Course Objectives:

COB 1: To equip the students with the knowledge on two-hinged and three-hinged arches.
COB 2: To enable the students with the basic concepts of lateral load analysis, characteristics of cables and suspension bridges.
COB 3: To familiarize the students with the basic concepts of different computation methods in indeterminate structure analysis.
COB 4: To enrich the students with the knowledge on moment distribution method, Kani’s method.
COB 5: To impart the knowledge on Flexibility and Stiffness matrix methods.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Analyze the two-hinged and three-hinged arches.
CO 2: Analyze the application of lateral loads in building frames.
CO 3: Examine the various characteristics in analyzing the cables and suspension bridges.
CO 4: Analyze the structures using Moment distribution method.
CO 5: Analyze the structures using Kani’s method.
CO 6: Analyze the structures using Flexibility and Stiffness matrix methods.

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UNIT – I
Three Hinged Arches:

Two Hinged Arches:
Determination of horizontal thrust - bending moment - normal thrust and radial shear – Rib shortening and temperature stresses - tied arches – fixed arches – (No analytical question).

UNIT – II
Lateral Load Analysis using Approximate Methods:
Application to building frames,
Cable structures and Suspension bridges:
Introduction - characteristics of cable - analysis of cables subjected to concentrated and uniformly distributed loads - anchor cable - temperature stresses - analysis of simple suspension bridge - three hinged and two hinged stiffening girder suspension bridges.

UNIT – III
Moment Distribution Method:
Stiffness and carry over factors – Distribution factors - Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycle.

UNIT – IV
Kani’s Method:
Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway.

UNIT – V
Flexibility Method:
Introduction - application to continuous beams (maximum of two unknowns) including Support settlements.
Stiffness Method:
Introduction - application to continuous beams (maximum of two unknowns) including support settlements.

Text Books:
3. Structural Analysis, R.C. Hibbeler, Pearson Education, India

Reference Books:
2. Theory of structures, Ramamuratam, Dhanpatrai Publications.
Web Links:
1. http://nptel.ac.in/downloads/105105109/

*****
WATER RESOURCE ENGINEERING–I

V Semester
Course Code: 171CE5T13

Course Objectives:
COB 1: To enable the students to know the concepts of hydrological cycle and its importance.
COB 2: To impart the knowledge on various abstractions of precipitation.
COB 3: To equip the students with the knowledge on characteristics of runoff and hydrograph analysis in estimating the runoff.
COB 4: To familiarize the students with the concept of floods, flood frequency studies and flood routing techniques.
COB 5: To enrich the students with the concepts of groundwater movement and well hydraulics

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Explain the major hydrological components - Intensity-Duration-Frequency curves and Depth-Area-Duration curves.
CO 2: Identify the various abstractions of precipitation and factors affecting it.
CO 3: Examine the various characteristics of runoff.
CO 4: Analyze the different types of unit hydrographs in rainfall-runoff modeling.
CO 5: Illustrate the various methods in flood frequency analysis and flood routing techniques.
CO 6: Analyze various ground water potential aquifer parameters and yield from wells.

Mapping of Course Outcomes with Program Outcomes:

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UNIT – I
Introduction:
Engineering hydrology and its applications - Hydrologic cycle - Hydrological data-sources of data.
Precipitation:
Types and forms - measurement - rain gauge network - presentation of rainfall data- average rainfall - continuity and consistency of rainfall data - frequency of rainfall - Intensity-Duration-Frequency (IDF) curves - Depth-Duration-Area (DDA) curves - Probable Maximum Precipitation (PMP) - design storm.

UNIT – II
Abstractions from precipitation:

UNIT–III
Runoff:
Catchment characteristics - factors affecting runoff - components - computation- empirical formulae - tables and curves - stream gauging - Rating curves - flow mass curve and flow duration curve - rainfall-runoff modeling.
Hydrograph analysis:
Components of hydrograph - separation of base flow - effective rainfall hyetograph and direct runoff hydrograph - unit hydrograph -assumptions - derivation of unit hydrograph - unit hydrographs of different durations - principle of superposition and S-hydrograph methods - Instantaneous unit hydrograph - limitations and applications of unit hydrograph.

UNIT – IV
Floods:
Causes and effects - flood frequency analysis- Gumbel’s and Log-Pearson type III distribution methods - Standard Project Flood (SPF) and Probable Maximum Flood (MPF) - flood control methods and management.
Flood Routing:
Hydrologic routing - channel and reservoir routing - Muskingum and Modified Puls methods of routing.

UNIT – V
Groundwater:
Occurrence - types of aquifers - aquifer parameters - porosity - specific yield - permeability - transmissivity and storage coefficient - types of wells - Darcy’s law - Dupuit’s equation- steady radial flow to wells in confined and unconfined aquifers - yield of a open well-recuperation test
**Text Books:**

**Reference Books:**
3. Irrigation, Water Resources & Water Power Engineering, Dr. P.N.Modi; standard Book House, New Delhi, 2006

**Web Links:**
1. http://nptel.ac.in/courses/105104103/

*****
CONSTRUCTION TECHNOLOGY AND MANAGEMENT  
(PROFESSIONAL ELECTIVE-I)  

V Semester  
Course Code: 171CE5E01  
Course Objectives:

COB 1 : To explain basic concept of project management including network drawing and monitoring.  
COB 2 : To equip the students with knowledge on better utilization of resources in construction.  
COB 3 : To impart knowledge on various equipment related to construction like earth moving equipment, trucks and handling equipment.  
COB 4 : To enable the students to know aggregate and concrete production equipments.  
COB 5 : To make student to know different types of pile driving equipment.  

Course Outcomes:  
At the end of the Course, Student will be able to:  

CO 1 : Plan and schedule on various construction projects.  
CO 2 : Solve PERT and CPM networks & have a better idea upon utilization of resources in Construction.  
CO 3 : Compare the functioning of various earth moving equipment.  
CO 4 : Explain the methods of production of aggregate and concreting.  
CO 5 : Classify different types of pile driving equipment.  

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UNIT – I:
Introduction:
Steps involved in planning - Objectives – Principles – Advantages - Limitations - Stages of planning - Scheduling - Preparation of construction schedules - Methods of scheduling - Bar charts - Milestone charts – Controlling - Project work break down.

UNIT – II:
Project Management Through Networks:
Objectives of network techniques - Fundamentals of network analysis - Events; Activities – Dummies - Types of networks - Choice of network type - Advantages of network techniques over conventional techniques.


UNIT – III:
Critical Path Method (CPM):
Introduction-Difference between CPM and PERT-Time estimates- Earliest event time- Latest event time- Float- Critical activities and critical path.

Cost Control: Direct cost-indirect cost-total project cost- Optimization of cost through networks-Steps involved In optimization of cost- allocation of resources

UNIT – IV:
Construction Equipment:
Classification of construction equipment- Earth moving equipment- capacities of trucks and handling equipment-calculation of truck production- Excavation equipment-Hauling equipment- Earth compaction equipment- Hoisting equipment.

UNIT – V:
Aggregate & Concreting Equipment:
Crushers & Types of crushers-selection of crushing equipment- concrete mixers- mixing and placing of concrete- consolidating and finishing- Piling & Pile driving equipment - form work- fabrication and erection.

Text Books:

Reference Books:
2. Project planning and control with PERT and CPM, Dr.B.C.Punmia, K.K.khandelwal, laxmi publications, 2016

Web Links:
1. nptel.ac.in/courses/105103093/
2. nptel.ac.in/courses/105103093/22
URBAN HYDROLOGY
(PROFESSIONAL ELECTIVE - I)

V Semester

Course Code: 171CE5E02

Course Objectives:

COB 1: To familiarize the students with the impact of urbanization on catchment basin hydrology.

COB 2: To enable the students with the knowledge on various methods in estimation of urban runoff.

COB 3: To equip the students with the knowledge on different elements of drainage systems.

COB 4: To impart the knowledge on design considerations of storm water drainage structures.

COB 5: To make the students know about the basic concepts on preparation of master urban drainage system

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Illustrate the importance of urban hydrological cycle and its significance in precipitation analysis.

CO 2: Apply the rational method and NRCS curve number approach for estimating runoff quality and quantity in urban drainage systems.

CO 3: Describe the various elements of drainage systems.

CO 4: Distinguish the storm water drainage structures and best practices in storm water management.

CO 5: Summarize the various concepts required in the preparation of master drainage plans.

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UNIT - I
Introduction:

Precipitation Analysis:
Importance of short duration of rainfall and runoff data - methods of estimation of time of concentration for design of urban drainage systems - Intensity-Duration -Frequency (IDF) curves - design storms for urban drainage.

UNIT –II
Urban drainage systems:
Time of concentration - peak flow estimation approaches - rational method - NRCS curve number approach - runoff quantity and quality - wastewater and storm water reuse - major and minor systems.

UNIT – III
Elements of drainage systems:
Open channel - underground drains - appurtenances - pumping - and source control.

UNIT– IV
Analysis and Management:

UNIT– V
Master drainage plans:
Issues to be concentrated upon – typical urban typical urban drainage master plan - interrelation between water resources investigation and urban planning processes - planning objectives - comprehensive planning - use of models in planning.

Text Books:

Reference Books:
2. Urban water cycle processes and interactions,Marsalek et.al 2006.

Web Links:
1. nptel.ac.in/downloads/105101002/3.
2. blogs.agu.org/water underground/about/
TRAFFIC ENGINEERING
(PROFESSIONAL ELECTIVE-I)

V Semester

Course Code: 171CE5E03

Course Objectives:

COB 1: To enable students to know various components and characteristics of traffic.
COB 2: To equip the students with knowledge on parking problems and manage traffic regulations.
COB 3: To impart knowledge on various traffic control devices and principles of highway safety.
COB 4: To make student to know detrimental effects of traffic on environment.
COB 5: To familiarize the students with knowledge on environment.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Identify traffic stream characteristics and studies.
CO 2: Explain traffic capacity and level of service.
CO 3: Solve various parking problems and manage traffic regulations.
CO 4: Illustrate measures for Road safety.
CO 5: Design traffic signal cycle and Rotary Island capacity.
CO 6: Classify various traffic-environment problems

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UNIT-I
Traffic Characteristics Measurement and Analysis:
Basic traffic Characteristics - Speed, Volume and Concentration. Relationship between Flow, Speed and Concentration. Traffic Measurement and Analysis - Volume Studies - Objectives, Methods; Speed studies – Objectives, Definition of Spot Speed, time mean speed and space mean speed; Methods of conducting speed studies; Presentation of speed study data; Head ways and Gaps; Critical Gap; Gap acceptance studies.

UNIT-II
Highway Capacity and Level Of Service:
Basic definitions related to capacity; Level of service concept; Factors affecting capacity and level of service; Computation of capacity and level of service for two lane highways, Multilane highways and freeways.
Parking Analysis:
Types of parking facilities – On-street parking and Off-street Parking facilities; Parking studies and analysis- Parking Inventory Study, Parking Usage Study By Patrolling, Questionnaire Survey, Cordon Surveys; Evaluation of parking parameters; Parking accumulation, Parking Load, Parking Turnover, Parking Index, Parking Volume

UNIT-III
Traffic Safety:
Traffic Safety -Accident studies and analysis; Causes of accidents - The Road, The vehicle, The road user and the Environment; Engineering, Enforcement and Education measures for the prevention of accidents.

UNIT-IV
Traffic Signals:

UNIT-V
Traffic and Environment:
Detrimental effects of Traffic on Environment, Air pollution; Noise Pollution; Measures to curtail environmental degradation due to traffic. Sustainable Transportation: Sustainable modes, Transit Oriented Development, ITS based benefits for Environment.

Text Books:
Reference Books:

Web Links:
1. https://nptel.ac.in/downloads/105101008/
EMPLOYABILITY SKILLS-III
(Common to all branches)

V Semester
Course Code: 171HS5T06

Course Objectives:

COB 1: To provide basic communication to ensure employability skills.
COB 2: To meet the changing global needs and demands.
COB 3: To orient students towards career and profession.
COB 4: To equip students with fundamental and advanced inputs as various techniques of strengthening their profession abilities.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Calculate the L.C.M and H.C.F of numbers by simple methods.
CO 2: Discuss about different numbers and its applications.
CO 3: Breakdown the typical write-up skills.
CO 4: Apply different types of models on ratio & proportion, average, ages and percentages.
CO 5: Demonstrate the tools of the soft skills.

Mapping of Course Outcomes with Program Outcomes:

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UNIT-I:
Aptitude: L.C.M & H.C.F
Soft Skills: Group discussion.

UNIT-II:
Aptitude: Problems On Numbers, Simple Equations

UNIT-III:
Aptitude: Ratio & Proportion
Soft Skills: E-mail -Writing & Etiquette, Business Etiquette.

UNIT-IV:
Aptitude: Average, Ages
Soft Skills: Interviewing skills-1, Do’s & don’ts in an interview, Interview Demonstration Videos, Interview Preparation.

UNIT-V:
Aptitude: Percentages
Soft Skills: Stress Management, Personal priorities effect on career decisions, Personal priorities to professional priorities.

Text Books:
1. Quantitative Aptitude - Dr. R.S. Aggarwal, S CHAND.
2. Quick Learning Objective General English – Dr. R.S. Aggarwal, S CHAND.

Reference Books

Web Links
1. www.indiabix.com
2. www.bankersadda.com
ENGINEERING GEOLOGY LAB

V Semester
Course Code: 171CE5L04

Course Objectives:
COB 1: To impart the knowledge on importance of geology.
COB 2: To enable the students to know the physical properties of minerals and rocks.
COB 3: To equip the students with knowledge on measuring secondary geological structures.
COB 4: To enrich the students with the knowledge on studying topographical maps.
COB 5: To familiarize the students with the basic concepts in interpretation of satellite imagery for feature identification.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Apply the knowledge of geology in the field of civil engineering.
CO 2: Explain physical properties of various minerals and rocks.
CO 3: Interpret geological maps, topographical maps and satellite imagery.
CO 4: Identify various geological formations.
CO 5: Distinguish various landforms and rock formations in constructional areas through field examinations.

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List of Experiments:

1. To identify the physical properties of Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite
2. To identify the physical properties of Olivine, Kyanite, Asbestos, Tourmaline, Calcite, Gypsum
3. To identify the physical properties of Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite
4. To identify the physical properties of Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt.
5. To identify the physical properties of Sedimentary rocks – Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglomerate
6. To identify the physical properties of Metamorphic rocks Granite Gneiss, Slate, Muscovite & Biotite schist, Marble, Khondalite
7. Interpretation of topographical maps and satellite imagery
8. Drawing of cross sections of formations from geological maps showing tilted beds, faults, unconformities
9. Simple Structural Geology problems
10. Field work – To identify Mineral and Rock deposits, Geomorphology & Structural Geology of an area

List of Augmented Experiments:
(Any two of the following experiments can be performed)

11. Electrical resistivity and seismic survey methods
12. Stratigraphy of India and Andhra Pradesh and borehole data
13. Finding Strike and Dip of geological formations using Brunton Compass

References:

Web Links:
1. https://nptel.ac.in/courses/105105106/5
2. https://www.slideshare.net/romangantawa/engineering-properties-of-rock
TRANSPORTATION ENGINEERING LAB

V Semester

Course Code: 171CE5L05

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Course Objectives:

COB 1: To enrich with the students the skill of testing the road aggregates.
COB 2: To equip the students with testing the properties of bitumen.
COB 3: To familiarise the students with the calculations of spot speed studies.
COB 4: To impart the students with the knowledge on Marshal mix design.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Characterise the highway aggregates.
CO 2: Conduct tests on suitability of bitumen.
CO 3: Identify the parking capacity and use of parking facilities.
CO 4: Design the marshal stability mix.

Mapping of Course Outcomes with Program Outcomes:

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List of Experiments:

1. To determine the Aggregate crushing value of aggregates
2. To determine the Aggregate impact value of aggregates
3. To determine the Flakiness index and elongation index of aggregates
4. To determine the Deval’s abrasion value of aggregates
5. To determine the Los angles abrasion value of aggregates.
6. To determine the Specific gravity & Water absorption of aggregates.
7. To determine the Penetration value and Softening point of bitumen.
8. To determine the Flash & fire point of bitumen.
9. To determine the Viscosity of bitumen.
10. To determine the Ductility value of bitumen.
List of Augmented Experiments:
(Any two of the following experiments can be performed)

11. To determine the spot speed
12. Marshall mix design
13. CBR test for soils

References:
3. Traffic Engineering & Transportation Planning, Dr. L.R. Kadyali, Khanna publications, 6th Edition

Web Links:
1. http://nptel.ac.in/courses/105101087/29

*****
SURVEYING CAMP

V Semester

Course Code: 171CE5P03

Course Objectives:

COB 1: To enable the student to determine regular and irregular area from field notes.
COB 2: To develop the student ability to estimate the levels of existing ground and prepare contour plan.
COB 3: To equip the students with necessary methods of setting out of simple curves and methods of contours.
COB 4: To educate the student to compute earthwork for highway/canal project.
COB 5: To familiarize the students to gain the knowledge on real time civil works.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Determine areas of regular and irregular fields.
CO 2: Estimating the levels of existing ground levels.
CO 3: Develop contour plans from the existing ground levels.
CO 4: Summarize the plan or map showing the ground features from data obtained by surveying.
CO 5: Prepare to work on-site works outside the institution to gain the real time exposure

Mapping of Course Outcomes with Program Outcomes

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Surveying camp is to be conducted for a minimum period of three days using any surveying equipment to train in any two of the following areas.

1. Find the regular area from field survey (minimum of two hectares)
2. Find the irregular area from field survey and compare with any other method of surveying
3. Establish the benchmarks of different places (leveling)
4. Set out simple circular curve
5. Find the earthwork computations for a highway/canal project
6. Find the horizontal distances and vertical heights of objects

**Final evaluation:** The nominated committee will evaluate the report submitted by each batch and the committee will declare the result in the form of satisfied or not satisfied

**References:**

1. Surveying (Vol No.1, 2 & 3) by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd, New Delhi, 2015.

**Web Links:**

1. www.civilengineeringx.com/surveying/computation-of-areas-from-field-notes/

*****
DESIGN AND DRAWING OF STEEL STRUCTURES

VI Semester

Course Code: 171CE6T14

3 1 0 3

Course Objectives:

COB 1: To equip the students with the knowledge on different types of connections and relevant IS codes.
COB 2: To impart the knowledge on design concepts of flexural members.
COB 3: To enable the students to design tension and compression members.
COB 4: To familiarize the students with different types of columns, column bases and their designs.
COB 5: To equip the students with the knowledge on design of plate girder and gantry girder.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Describe the basic requirements of the IS design specifications.
CO 2: Choose the suitable IS Rolled Steel Sections for design.
CO 3: Design of Bolted & Welded connections between the steel members.
CO 4: Design of Steel members subjected to Flexure, Tension and Compression.
CO 5: Design of Columns and Base plates subjected to gravity loads.
CO 6: Design of Gantry Girders and Plate Girders subjected to gravity loads.

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UNIT I
Connections:
Introduction - Properties of structural steel - IS Rolled sections - IS. Specifications - Lap and Butt connections (revited and bolted connections) - Eccentric connections.
Welded connections:
Introduction - Advantages and disadvantages of welding- Strength of welds - Butt and fillet welds - Permissible stresses - IS Code requirements - Design of Butt and fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT II
Beams:
Allowable stresses - Design requirements as per IS Code-Design of simple and compound beams - Curtailment of flange plates - Beam to beam connection - check for deflection, shear, buckling, and bearing - Design of laterally unsupported beams.

UNIT III
Tension Members:
Introduction to different modes of failures - gross section yielding - Net Section rupture and block shear failure - Determine the design strength due to yielding of gross section - rupture of critical section and block shear - Design of tension members. (Tension Members Subjected to UDL along the Longitudinal Axis.)
Compression Members:
Effective length of columns - Slenderness ratio -permissible stresses - Design procedure of compression members - Design of built-up sections (Laced and Battened Columns).

UNIT IV
Design of Column Foundations:
Introduction - Design of slab base - Design of gusset base- Column bases subjected to moment.

UNIT – V
Design of Plate Girder:
Design of Gantry Girder:
Introduction - Impact factors - longitudinal forces- Design of Gantry girders.

NOTE:
Welding Connections should be used from Unit II – Unit V.
The students should prepare the following plates.
Plate 1 Detailing of steel members Connection.
Plate 2 Detailing of simple beams & Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases, slab base and gusseted base.
Plate 5 Detailing of Plate girder including curtailment, splicing and stiffeners.
**Internal Examination Pattern:**
The total internal marks (40) are distributed in three components as follows:

1. Descriptive (subjective type) examination : 24 marks
2. Detailing sheets (For above plates) : 10 marks
3. Assignment : 06 marks

**Final Examination Pattern:**
The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing, out of which one question is to be answered. Part B should consist of six questions and design, out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

**Text books:**
4. Design of Steel Structures, Ramachandra, Scientific Publishers Journals Dept, 2011

**I S Code books:**
3. Steel Tables
   (These codes and steel tables are permitted to use in the examination).

**Reference books:**

**Web Links:**
1. https://nptel.ac.in/courses/105106112/
2. https://lecturenotes.in/subject/161/design-of-steel-structure-dss
3. https://www.slideshare.net/sukhdarshansingh90/steel-structures-25946406

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GEOTECHNICAL ENGINEERING-I

VI Semester

Course Code: 171CE6T15

Course Objectives:

COB 1: To equip the students with the knowledge on index properties and classification of soils.
COB 2: To enable the students to learn about permeability of soil.
COB 3: To enrich the students with the knowledge on stress distribution in soil.
COB 4: To impart the knowledge on principles of compaction and consolidation of soil.
COB 5: To enable the students to learn the shear parameters of soil.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Interpret the various properties related to soil.
CO 2: Classify the various types of soils.
CO 3: Determine the permeability of different types of soils.
CO 4: Calculate vertical stresses due to applied loads
CO 5: Differentiate the concepts of compaction and consolidation.
CO 6: Determine the shear strength parameters of different soils.

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UNIT-I
Introduction & Index properties of soils:

UNIT-II
Permeability:
Soil water – capillary rise – flow of water through soils – Darcy’s law – permeability – Factors affecting laboratory determination of coefficient of permeability – Permeability of layered systems. Total, neutral and effective stresses

UNIT-III
Seepage through Soils:
Stress Distribution in Soils:
Stresses induced by applied loads - Boussinesq’s and Westergaard’s theories for point loads and areas of different shapes – Newmark’s influence chart.

UNIT-IV
Compaction:
Consolidation:

UNIT-V
Shear strength of soils:
Basic mechanism of shear strength – Mohr – Coulomb failure theories – Shear strength determination – Strength tests based on drainage conditions – Shear strength of sands – Critical Void Ratio – Stress-Strain behaviour of clays – Liquefaction.

Text books:
Reference books:

Web Links:
1. http://nptel.ac.in/courses/105103097/
2. http://nptel.ac.in/courses/105101084/

*****
WATER RESOURCE ENGINEERING-II

VI Semester

Course Code: 171CE6T16

Course Objectives:

COB 1: To enrich the students with the fundamental concepts of irrigation and diversion head works
COB 2: To equip the students with the knowledge on design of canals and design principles of canal structures.
COB 3: To impart the knowledge on canal regulation and cross drainage works.
COB 4: To familiarize the students with the basic concepts of reservoir planning and design criteria of gravity dams.
COB 5: To enable the students with the knowledge on various design concepts of earthen dams and spillways.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Classify the various irrigation systems and diversion head works.
CO 2: Design the canal and canal structures.
CO 3: Illustrate the various design considerations of canal regulation and cross drainage works.
CO 4: Analyze the reservoir planning characteristics and design aspects of gravity dams.
CO 5: Examine the design particulars of earthen dams and spillways.

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UNIT –I
Irrigation:
Types of irrigation systems - soil moisture constants - irrigation water requirements - consumptive use and its estimation - duty and delta – factors affecting - depth and frequency of irrigation - irrigation efficiencies.

Diversion Head Works:
Types of diversion head works - weirs and barrages - layout of diversion head works - components. causes and failures of weirs on permeable foundations - Bligh’s creep theory - Khosla’s theory - design of impervious floors for subsurface flow – exit gradient.

UNIT-II
Canals:
Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity - design of erodible canals -Kennedy’s silt theory and Lacey’s regime theory - balancing depth of cutting.

Canal Structures:
Falls: Types and location - design principles of Sarada type fall and straight glacis fall.

UNIT-III
Canal Regulation and Cross Drainage works:
Head and cross regulators - design principles - Types and selection of cross drainage works - design principles of aqueduct - siphon aqueduct and super passage - canal outlets-types - proportionality - sensitivity and flexibility.

UNIT-IV
Reservoir Planning and Dams:
Investigations - site selection for reservoir and dams - zones of storage - yield and storage capacity of reservoir - reservoir sedimentation - types of dams -

Earth Dams:
Types, causes of failure - criteria for safe design - seepage - measures for control of seepage-filters - stability analysis-stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.

UNIT-V
Gravity dams:
Forces acting on a gravity dam - causes of failure of a gravity dam - elementary and practical profile of a gravity dam - limiting height of a dam - stability analysis - drainage galleries - grouting.

Spillways:
Types - design principles of Ogee spillways - types of spillway crest gates - energy dissipation below spillways - stilling basin and its appurtenances - tail water rating curves.
Text Books:

Reference Books:

Web Links:
1. https://nptel.ac.in/downloads/105105110/
2. https://engineering.tamu.edu/

*****
VI Semester

Course Code: 171CE6T17

Course Objectives:
COB 1: To enable the students to illustrate the behaviour of prestressed concrete.
COB 2: To equip the student with the knowledge on different losses in prestress.
COB 3: To make the students to perform the analysis and design of prestressed concrete flexural members.
COB 4: To enable the students to evaluate deflection and crack control of prestressed concrete members.
COB 5: To impart knowledge on transfer of stress in prestressed concrete.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Explain methods of prestressed concrete.
CO 2: Calculate various losses in prestressed concrete sections.
CO 3: Analyse the members for flexure, shear and torsion.
CO 4: Design prestressed concrete members for deflection and crack control
CO 5: Design of end blocks for post tensioned members.

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UNIT – I

Basic concepts of Prestressing:
Prestressing Systems:

UNIT – II
Losses of Pre-stressing:

UNIT – III
Deflections and Flexure Strength:

UNIT – IV
Design for Shear and Torsion

UNIT – V
Transfer of Stresses: Transfer of Prestress in pre tensioned members – Transmission length – Bond stresses – end zone reinforcement – Codal provisions – Anchorage zone Stresses in Post tensioned members – Stress distribution in end block – Anchorage Zone reinforcement.

Text books:

Reference books:

IS Code Books:
1. IS1343-2012, Code of Practice for Prestressed Concrete.
2. IS1343-1980, Code of Practice for Prestressed Concrete.
Web Links:
1. https://nptel.ac.in/courses/105106118/
3. https://nptel.ac.in/courses/105106117/

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GROUND WATER DEVELOPMENT
(PROFESSIONAL ELECTIVE II)

VI Semester

Course Code: 171CE6E04

Course Objectives:

COB 1: To familiarize the student with the importance and scarcity of ground water.
COB 2: To enrich the student with the knowledge on flow towards wells in confined and unconfined aquifers.
COB 3: To impart the knowledge on various recharge techniques and various geophysical approaches for groundwater exploration.
COB 4: To enable the student to know the importance of saline water intrusion in coastal aquifers.
COB 5: To enable the students well-acquainted on basic of groundwater modelling.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Interpret aquifer parameters and yield of wells.
CO 2: Analyze radial flow towards wells in confined and unconfined aquifers.
CO 3: Explain water well designs and the construction practices.
CO 4: Illustrate geophysical exploration data as a scientific source in finding of aquifers
CO 5: Experiment with the process of artificial recharge for increasing groundwater potential for different topographic areas.
CO 6: Analyze effective measures for controlling saline water intrusion.

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Mapping of Course Outcomes with Program Specific Outcomes:

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UNIT I:
Introduction to groundwater:
Hydrological cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation. Well Hydraulics Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jacob and Chow’s methods, Leaky aquifers.

UNIT II:
Well Design and Well Development:
Water well design, well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery. Well Construction and Development Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail-down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT III:
Artificial recharge of Groundwater:
Artificial Recharge Concept of artificial recharge of groundwater, rechargemethods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge.
Saline Water Intrusion:
Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT IV:
Groundwater Exploration:

UNIT V:
Groundwater Modelling and Management:
Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

Text books:

Reference books:

Web Links:
2. https://nptel.ac.in/courses/105103026/
3. https://www.southalabama.edu/geology

*****
# PAVEMENT ANALYSIS AND DESIGN  
(PROFESSIONAL ELECTIVE – II)

VI Semester  
Course Code: 171CE6E05  

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## Course Objectives:

COB 1: To equip the students with the knowledge on various factors affecting pavement design.

COB 2: To make the students well-acquainted on the basic concepts of flexible and rigid pavements.

COB 3: To impart knowledge on concepts of mix design and material characterization.

COB 4: To familiarize the students with design principles of flexible and rigid pavements.

COB 5: To enable the students to know the design principles of shoulders – overlays and drainage.

## Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Describe the principles and concepts in pavement design.

CO 2: Determine the stresses in pavements.

CO 3: Calculate the bituminous mixes.

CO 4: Design the flexible and rigid pavements using various methods.

CO 5: Explain the shoulders, overlays and drainage thickness and width considerations.

## Mapping of Course Outcomes with Program Outcomes:

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UNIT I
Material Characterization:

UNIT II
Parameters for Pavement Analysis:
Elastic modulus – Poisson’s ratio – wheel load – wheel configuration – tyre Pressure – contact pressure material characteristics – climatic factors.

UNIT III
Design of Flexible Pavements:

UNIT IV
Design of Rigid Pavements:
IRC method of rigid pavement design – importance of joints in rigid pavements types of joints – use of tie bars and dowel bars. Stresses in rigid pavements – relative stiffness of slab – modulus of sub-grade reaction – stresses due to warping – stresses due to loads – stresses due to friction.

UNIT V
Highway Maintenance:

Text books:
2. Principles and Practices of Highway Engineering, Dr.L.R.Kadiyali & Dr.N.B.Lal, Khanna publishers, 2017

Reference books:
IS Code Books:

Web Links:
1. http://nptel.ac.in/courses/105101087/20
3. http://nptel.ac.in/courses/105101087/29
REPAIR AND REHABILITATION OF STRUCTURES (PROFESSIONAL ELECTIVE-II)

VI Semester

Course Code: 171CE6E06

Course Objectives:

COB 1: To familiarize the students with various types of deteriorations and need for rehabilitation.
COB 2: To create awareness in damage assessment of various types of deteriorations.
COB 3: To produce Civil Engineering students to have strong foundation in non-destructive testing and rehabilitation methods.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Identify and evaluate the degree of damage in structures.
CO 2: Select and suggest suitable retrofitting methods.

Mapping of Course Outcomes with Program Outcomes:

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UNIT – I
Introduction
Deterioration of structures with aging – Need for rehabilitation

UNIT - II
Distress in concrete and steel structures:
Types of damages–Sources or causes for damages–Effects of damages–Case studies non-destructive evaluation–Importance–Concrete behaviour under corrosion–Disintegrated mechanisms–Moisture effects and thermal effects.

UNIT - III
Damage assessment and evaluation models:
UNIT - IV
Rehabilitation methods:

Methods of repair:

UNIT - V
Seismic retrofitting of reinforced concrete buildings:
Introduction –Considerations in retrofitting of structures –Source of weakness in RC frame building –Structural damage due to discontinuous load path –Structural damage due to lack of deformation –Quality of workmanship and materials –Classification of retrofitting techniques –Retrofitting strategies for RC buildings –Structural level (global) retrofit methods –Member level (local) retrofit methods –Comparative analysis of methods of retrofitting.

Text books:
2. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002 (freely available through Internet).

Reference books:
1. Concrete technology- Neville & Brooks.
2. Special Structural concrete- Rafat Siddique.
3. Concrete repair and maintenance illustrated- Peter H Emmons.
6. Concrete repair and maintenance Illustrated by Peter.H.Emmons, Galgotia publishers.

Web Links:
1. https://www.google.com/search?q=repair+and+rehabilitation+of+structures+lecturer+notes+nptel&sa=X&ved=2ahUKEwjHkrv53TeAhUKbySKHZUHBRkQ1QIoAnoECAUQAw&biw=1536&bih=674

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GROUND IMPROVEMENT TECHNIQUES
(PROFESSIONAL ELECTIVE - III)

VI Semester
Course Code: 171CE6E07

Course Objectives:
COB 1: To enable the students to acquaint with the concepts behind a range of Ground Improvement Techniques.
COB 2: To equip the students with the necessary skills of implementation of geotechnical knowledge in field situations.
COB 3: To interpret design principles of reinforced soil walls.
COB 4: To familiarize the students about the grouting techniques with respect to field conditions.
COB 5: To impart the knowledge on reinforcement to soils in the form of geo textiles and other synthetic materials.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Interpret the concepts behind a range of ground improvement and soil remediation techniques.
CO 2: Illustrate the appropriate techniques for a range of ground and site conditions.
CO 3: Identify the techniques for stabilization of soils with different materials.
CO 4: Classify different types of grouts, their properties and application
CO 5: Make use of different geo synthetics in field applications.

Mapping of Course Outcomes with Program Outcomes:

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UNIT I
In Situ Densification Methods and Dewatering:
In situ densification of granular soils - vibration at ground surface and at depth - impact at ground and at depth - in situ densification of cohesive soils - pre loading - vertical drains - sand drains and geo drains - stone columns.

Dewatering:
Sumps and interceptor ditches - single and multi stage well points - vacuum well points - horizontal wells - criteria for choice of filler material around drains - electro osmosis

UNIT II
Stabilization of soils:
Methods of soil stabilization - mechanical - cement - lime-bitumen and polymer stabilization - use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT III
Reinforced Earth Technology:
Concept of soil reinforcement - Reinforcing materials - Backfill criteria - Design of reinforcement for internal stability - Applications of Reinforced earth structures.

UNIT IV
Grouting Techniques:
Types of grouts - grouting equipment and machinery - injection methods - grout monitoring, stabilization with cement - lime and chemicals - stabilization of expansive soils.

UNIT V
Geosynthetics:
Introduction - type of geosynthetics - Geotextiles - types - functions - properties and applications - geogrids - geomembranes and gabions - properties and applications.

Text Books:
1. Ground Improvement techniques by Purushothama Raj Laxmi Publications, 1st Ed, New Delhi, 1999
3. An Introduction to Ground Improvement Engineering by Mittal.S, Medtech Publisher, 2013.

Reference Books:
Web Links:
1. http://nptel.ac.in/courses/105108075/
2. https://lecturenotes.in/subject/228/ground-improvement-techniques
3. https://www.vidyarthiplus.com
1. https://www.smartzworld.com/notes/

****
FINITE ELEMENT METHOD  
(PROFESSIONAL ELECTIVE-III)  

VI Semester  
Course Code: 171CE6E08  

Course Objectives:  
COB 1: To enable the students to know the basic principles of finite element methods.  
COB 2: To make the students to develop proficiency in the application of the finite element methods.  
COB 3: To equip the students with the knowledge on analysis of two dimensional problems.  
COB 4: To equip the students with the knowledge on the continuum.  
COB 5: To impart the students with the knowledge on developing numerical solution.  

Course Outcomes:  
At the end of the Course, Student will be able to:  
CO 1: Summarize the direct and formal methods for deriving finite element equations.  
CO 2: Solve engineering problems in truss elements using FEM.  
CO 3: Apply FEM for analysis of beam and frame elements.  
CO 4: Explain the principles of stress-strain behaviour of continuum  
CO 5: Discuss the role and significance of shape functions in finite element formulations.  

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UNIT-I:  
Introduction:  

UNIT-II:  
Finite Element formulation of Truss Element:  

UNIT-III:  
Finite Element formulation of Beam Elements:  
Beam stiffness-assemble of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading- Galerkin’s method - 2-D Arbitrarily oriented beam element – inclined and skewed supports – rigid plane frame examples

UNIT-IV:  
Plane Stress and Plane Strain Analysis:  
Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress & strains- comparison of CST and LST elements—convergence of solution-interpretation of stresses

UNIT-V:  
Isoparametric Elements & Numerical Integration:  

Text books:  

Reference books:  

Web Links:  
1. https://nptel.ac.in/courses/105105041/  
2. https://nptel.ac.in/downloads/105108141/  

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EARTHQUAKE RESISTANT DESIGN
(PROFESSIONAL ELECTIVE - III)

VI Semester

Course Code: 171CE6E09

Course Objectives:

COB 1: To enable the students to know the causes and effects of earthquake.
COB 2: To facilitate the students to analyze the basic concepts of structural dynamics.
COB 3: To impart the knowledge on application of single degree and multi-degree of freedom systems.
COB 4: To familiarize the students with various codal provisions for common irregularities in earthquake resistant design.
COB 5: To equip the students with the knowledge on designing of earthquake-resistant structures and shear walls.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain earthquake causes and its effects.
CO 2: Demonstrate the basic concepts of structural dynamics.
CO 3: Utilize the concepts of single degree and multi-degree of freedom systems.
CO 4: Apply current codal provisions for designing of earthquake resistant structures
CO 5: Design of earthquake resistant structures and behavior of shear walls.

Mapping of Course Outcomes with Program Outcomes:

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UNIT I
Earthquake Engineering:

UNIT II
Introduction to Structural Dynamics:

UNIT III
Multi-Degree of Freedom (MDOF) Systems:

UNIT IV
Codal Design Provisions:

Ductility:

UNIT – V
Seismic Planning:

Shear walls:
Design of Shear walls as per IS: 13920 – Detailing of reinforcements.

Case Studies on earthquakes.
Text books:

Reference books:

IS Code Books:
4. IS-13920:2016, Ductile Design And Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces

Web Links:
1. https://nptel.ac.in/courses/105101004/
2. https://nptel.ac.in/downloads/105101004/
3. https://www.slideshare.net/mvm2594/earthquake-resistant-designs-12158375

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VI Semester
Course Code: 171HS6T07

Course Objectives:
COB 1: To equip the students to utilize the emerging trends in learning.
COB 2: To equip the students with critical analytical, conceptual and other skills.
COB 3: To enable students to work in different professions-teaching, software, research, administration, etc.
COB 4: To provide skills fit for job and fit for life and make them experts in their respective area of study.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Find profit and loss, simple and compound interest for different models.
CO 2: Identify leadership and make use of group dynamic skills.
CO 3: Calculate solutions for time and work, time and distance and data interpretation.
CO 4: Define and focus on Interview skills.

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UNIT-I:
Aptitude: Profit And Loss
Soft Skills: Group discussion -2, Importance-Definition-Objective-Types-Skills Developed-Myths- Do's And Don’ts-Parameters of Evaluation- Process.

UNIT-II:
Aptitude: Simple Interest and Compound Interest.
Soft Skills: Speech- Debate -JAM -Importance -Do’s & Don’ts.

UNIT-III:
Aptitude: Time and Work, Pipes and Cisterns.

UNIT-IV:
Aptitude: Time and Distance, Trains, Boats and Streams.

UNIT-V:
Aptitude: Data Interpretation.

Text Books:
1. Quantitative Aptitude - Dr. R.S. Aggarwal, S CHAND.
2. Quick Learning Objective General English – Dr. R.S. Aggarwal, S CHAND.

Reference Books

Web Links
1. www.indiabix.com
2. www.bankersadda.com
GEOTECHNICAL ENGINEERING LAB

VI Semester

Course Code: 171CE6L06

Course Objectives:

COB 1 : To familiarize the students with the physical properties like water content, specific gravity.
COB 2 : To impart knowledge on the concepts of index properties and gradation analysis required for classification of soils.
COB 3 : To equip the students with the knowledge on engineering properties.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 : Describe the physical properties of various soils.
CO 2 : Classify the various types of soils.
CO 3 : Determine the engineering properties of soils.

Mapping of Course Outcomes with Program Outcomes:

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List of Experiments:

1. To determine the water content by oven drying method and specific gravity of soil by using pycnometer.
2. To determine the Atterberg limits.
3. To determine the Gradation analysis by Sieve analysis.
4. To determine the field unit weight by a) Core cutter method b) Sand Replacement method.
5. To determine the permeability by Constant head method.
6. To determine the permeability by Variable head method.
7. To determine the maximum dry density by standard proctor test.
8. To determine the California bearing ratio by CBR test.
9. To determine the shear parameters by Direct Shear test and Vane Shear Test.
10. To determine the shear parameters by Triaxial Compression test.
List of Augmented Experiments:
(Any two experiments to be conducted from the following)
   11. To determine the Gradation analysis by Hydrometer analysis.
   12. To determine the maximum dry density by Modified proctor test.
   13. To determine the Consolidation of the soil.

Reference books:

Web Links:
   1. http://nptel.ac.in/courses/105103097/
   2. http://nptel.ac.in/courses/105101084/

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IRRIGATION DESIGN AND DRAWING

VI Semester

Course Code: 171CE6L07

Course Objectives:

COB 1: To equip the students with the knowledge on different types of hydraulic structures in minor and major irrigation systems and their functions.

COB 2: To enable the students to know about the design concepts of irrigation structures.

COB 3: To familiarize the students with drawings of various Irrigation structures.

COB 4: To make the students to know the critical points in design of a major irrigation systems.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Design and draw diversion head works surplus weir and Tank sluice with tower head.

CO 2: Design and draw canal drop with notch type.

CO 3: Design and draw canal regulator.

CO 4: Design and draw under tunnel

CO 5: Design and draw syphon aqueduct type-III.

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Design and Drawing of:

1. Surplus weir.
2. Tank sluice with a tower head
4. Canal regulator
5. Under tunnel
6. Syphon aqueduct Type III
Final Exam Pattern: Any two questions of the above six designs may be given, out of which the candidate has to answer one question. The duration of the examination is three hours.

Text books:
2. Irrigation, water power and water resources Engineering, Dr. K.R. Arora,

References:

Web Links:
3. https://www.slideshare.net/gauravhtandon1/canal-regulation-cross-drainage-works

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GEOTECHNICAL ENGINEERING-II

VII Semester
Course Code: 171CE7T18

Course Objectives:
COB 1: To equip the student with the knowledge on soil exploration methods.
COB 2: To make the student to learn about the earth pressure theories.
COB 3: To familiarize the students with the concepts of stability analysis.
COB 4: To enable the student to study the design principles of shallow foundations.
COB 5: To impart the knowledge on behaviour of pile foundations and the principles of well foundations.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Illustrate the phenomenon of soil exploration.
CO 2: Solve the problems related to concept of earth-retaining structures.
CO 3: Demonstrate the concepts of stability analysis.
CO 4: Determine the allowable bearing pressure and dimensions of the footings.
CO 5: Explain the load carrying capacity of pile sand design principles of well foundations.

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UNIT I
Soil Exploration:
Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration tests – Pressure meter – Planning of program and preparation of soil investigation report.
UNIT II
Earth Pressures & Retaining Walls:

UNIT III
Stability of Slopes:

UNIT IV
Shallow Foundations – Bearing Capacity Criteria:
Types of foundations and factors to be considered in their location – Bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi’s theory –IS Methods.
Shallow Foundations – Settlement Criteria:
Safe bearing pressure based on N-value – Allowable bearing pressure – Safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination – Allowable settlements of structures.

UNIT V
Pile Foundations:
Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile capacity based on empirical relations –Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.
Well Foundations:
Types – Different shapes of well – Components of well – Functions – Forces acting on well foundations – Construction and Sinking of wells – Tilt and shift.

Text books:

Reference books:
Web Links:
1. http://nptel.ac.in/courses/105103097/
2. http://nptel.ac.in/courses/105101084/

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### Course Objectives:

- **COB 1**: To enlighten the importance of protected water supply planning and design for a city.
- **COB 2**: To impart basic knowledge on treatment and distribution of potable water to public.
- **COB 3**: To equip the students with the concepts of design of sewerage systems.
- **COB 4**: To enable the students to update their knowledge on methods of treatment of sewage.
- **COB 5**: To familiarize the students with the concepts of sludge management and recycling of treated water.

### Course Outcomes:
At the end of the Course, Student will be able to:

- **CO 1**: Apply basic principles of water supply in designing of protected water for a city.
- **CO 2**: Illustrate various treatment methods based on characteristics of raw water.
- **CO 3**: Interpret different treatment technologies of wastewater based on characteristics of sewage.
- **CO 4**: Select an appropriate secondary and tertiary treatment method of sewage.
- **CO 5**: Demonstrate the concepts of sludge management and its disposal methods.
- **CO 6**: Choose the method of recycling of treated water

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UNIT I
**Introduction to protected water supply system:**
Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations factors affecting water demand, Design Period, population forecast, Sources of water, Intakes, conveyance of raw water.

UNIT II
**Raw water treatment and Distribution:**

UNIT III
**Sewage characteristics and treatment methods:**
Systems of sanitation, relative merits & demerits, collection and conveyance of waste water, Classification of sewerage systems, Estimation of sewage flow and storm water drainage, fluctuations, Types of sewers, Hydraulics of sewers and storm drains, Design of sewers, appurtenances in sewerage, Types of pumps and their suitability with regard to wastewaters, Sampling of wastewater, Physical, Chemical and Biological Examination of sewage, Primary treatment, Screens, grit chambers, Floatation, design of preliminary and primary treatment units.

UNIT IV
**Secondary and Tertiary treatment methods:**
Aerobic and anaerobic treatment process comparison, Activated Sludge Process, principles, designs, and operational problems, Oxidation ponds, Trickling Filters– mechanism of impurities removal, classification, design, operation and maintenance problems, RBCs, Fluidized bed reactors, Removal of Nitrogen and Phosphorus, Septic Tanks and Imhoff tanks.

UNIT V
**Sludge management and recycling of treated water:**
Characteristics of sludge, handling and treatment of sludge-thickening, anaerobic digestion of sludge, Sludge drying beds, Methods of disposal, Disposal into water bodies, Oxygen Sag Curve, disposal into sea, disposal on land, sewage sickness, Importance of Recycling, Indirect and Direct methods of recycling, Guidelines of reuse of treated water, recent trends in recycling.
Text Books:
4. Environmental Engineering, Howard S Peavy, Donald R Rowe, George Tchobanoglous, Mc Grawhill, 2017

Reference Books:

Web Links:
1. www.nptel.ac.in/courses/105104102
3. https://www.intelitek.com > engineering

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REMOTE SENSING AND GIS APPLICATIONS

VII Semester

Course Code: 171CE7T20

Course Objectives:

COB 1: To familiarize the student about the principles of GIS, Remote Sensing, Spatial Systems, and its applications to Engineering Problems.

COB 2: To make the student understand the knowledge of acquiring the satellite images in different scales, bands, mosaic and interpret.

COB 3: To equip the student with the expertise knowledge in interpretation of different satellite images and other maps.

COB 4: To impart the knowledge on classification of different satellite images for wide variety of applications.

COB 5: To enable the student to extract and develop different scale of raster and vector datum as required for research works.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Classify the information content of remotely sensed data.

CO 2: Explain the energy interactions in the atmosphere and earth surface features.

CO 3: Interpret the images for preparation of thematic maps.

CO 4: Analyze spatial and attribute data for solving spatial problems.

CO 5: Develop GIS and cartographic outputs for presentation.

CO 6: Apply problem specific remote sensing data for engineering applications.

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UNIT – I
Basic concepts of Photogrammetry:
Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

Introduction and Basic Concept of Remote Sensing:
Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

UNIT – II
Sensors and platforms:
Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats - band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

Image interpretation:
Introduction, elements of visual image interpretations, digital image processing - image pre-processing, image enhancement, image classification, supervised classification, unsupervised classification

UNIT – III
Geographic Information System:
Introduction to GIS; Components of a GIS, Geospatial Data: Spatial Data and Attribute data, Joining Spatial and Attribute data.
Coordinate Systems:
Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections - Map projection parameters, commonly used Map Projections

UNIT – IV
Spatial data analysis:
Introduction, data models, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis - optimal path finding, network allocation, network tracing.

UNIT – V
Applications of Remote Sensing and GIS:
Application of Remote Sensing and GIS in civil engineering, groundwater prospecting and identification of potential zones for artificial recharge, transportation, agriculture, Forestry, Land cover and land use, geology and geomorphology, floodplain delineation.

Text Books:
Reference Books:

Web Links:
3. https://nptel.ac.in/downloads/105108077/

*****
ESTIMATION, SPECIFICATIONS AND CONTRACTS

VII Semester

Course Code: 171CE7T21

L T P C
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Course Objectives:

COB 1: To make the students know the types of estimates and different specifications for civil works.

COB 2: To enable the students to analyze the rates of different civil works and earthwork quantities.

COB 3: To equip the students with the knowledge on bar bending schedule for different building components.

COB 4: To facilitate the students to summarize the different types of contracts, tenders and valuation.

COB 5: To familiarize the students to estimate the quantities of building components by different methods.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Describe the importance of specifications and abstract estimate for different civil engineering works.

CO 2: Prepare rate analysis for different civil work items.

CO 3: Estimate the earth work quantities for roads and canals

CO 4: Prepare bar bending schedule for different RCC components.

CO 5: Classify different types of Contracts and Tenders.

CO 6: Prepare valuation reports for roads and buildings

CO 7: Estimate the quantities for different building components

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UNIT I
Introduction

Specifications

UNIT II
Rate Analysis
Task or output work – labour and materials required for different works – Rates of materials and labour – Preparing analysis of rates by using SSR for the following items of work – Concrete – RCC Works – Brick work in foundation and super structure – Plastering – CC flooring – Painting.

UNIT III
Earth Works
Estimation of earth work of road from longitudinal sections – Earthwork in canals – different cases – Estimation of earthwork in irrigation channels.

Bar bending schedules and Estimation of RCC Works
Quantity estimation and bar bending schedule for RCC roof slab – Quantity estimation and bar bending schedule for RCC beam – Quantity estimation and bar bending schedule for RCC Column with foundation footing – Quantity estimation and bar bending schedule for RCC retaining wall.

UNIT IV
Contracts

Valuation
UNIT V

Estimation of Buildings
Detailed Estimation of Buildings using centre line method.
Detailed Estimation of Buildings using individual wall method.

FINAL EXAMINATION PATTERN:
The end examination paper should consist of six questions from Unit 1 to Unit 4, out of which three are to be answered (60% weightage) & one mandatory question (40% weightage) from Units 5 is to be answered.

Text Books:

Reference Books:
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)

Web Links:
2. esurveying.net/land-survey/earthwork-volume-calculation
3. https://nptel.ac.in/courses/105103093/15
5. https://esub.com/4-types-construction-contracts/

*****
ADVANCED STRUCTURAL ENGINEERING
(PROFESSIONAL ELECTIVE-IV)

VII Semester

Course Code: 171CE7E10

Course Objectives:

COB 1: To impart the knowledge on the basics of theory of elasticity.

COB 2: To introduce the concepts and tools used in structural dynamics.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the basics of theory of elasticity.

CO 2: Distinguish between the rectangular and polar co-ordinates in two dimensional problems.

CO 3: Appreciate the issues related to the dynamic elastic behaviour of structures.

CO 4: Determine the response of structures for free and forced vibrations.

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UNIT – I
Introduction to Theory of Elasticity:
Introduction to Theory of Elasticity – Notations for forces and stresses – Components of stresses and strains – Hooke’s Law.

UNIT - II
Plane Stress and Plane Strain:
Conditions of plane stress and strain-definitions – Differential equations of equilibrium – Boundary conditions and compatibility equations.
UNIT - III
Two dimensional problems:

UNIT – IV
Structural Dynamics:

UNIT - V
Vibrations:

Text Books:

Reference Books:

Web Links:
2. https://nptel.ac.in/courses/105108070/
3. https://nptel.ac.in/courses/105101006/
WATER SHED MANAGEMENT
(PROFESSIONAL ELECTIVE – IV)

VII Semester

Course Code: 171CE7E11

Course Objectives:

COB 1: To enable the student to understand the objectives and characteristics of watershed management.
COB 2: To familiarize the students with the concepts of soil erosion.
COB 3: To impart the knowledge on water harvesting techniques.
COB 4: To equip the student with the knowledge of land and drought management.
COB 5: To enable the students to understand the watershed modelling.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the objectives and characteristics of watershed management.
CO 2: Classify the types of soil erosion and choose the methods to control soil erosion.
CO 3: Select suitable water harvesting techniques.
CO 4: Organize the land and drought management techniques.
CO 5: Make use of the watershed models.

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UNIT -I

Introduction:

Concept of watershed development – objectives of watershed development – need for watershed development – integrated and multidisciplinary approach for watershed management.
Characteristics of Watershed:

UNIT -II
Principles of Erosion:

Measures to Control Erosion:

UNIT –III
Water Harvesting:

UNIT-IV
Land Management:

Drought Management:

UNIT -V
Watershed Modelling:
Data of watershed for modelling – application and comparison of watershed models – model calibration and validation – advances of watershed models.

Text books:

Reference books:
Web Links:
2. http://agritech.tnau.ac.in/agriculture/agri_majorareas_watershed_watershedmgt.html
DESIGN OF TALL BUILDINGS
(PROFESSIONAL ELECTIVE- IV)

VII Semester
Course Code: 171CE7E12

Course Objectives:

COB 1 : To equip the students with the knowledge on various types of concrete used in construction of tall buildings.

COB 2 : To familiarize the students with various loads acting on buildings and distribution of loads.

COB 3 : To enable the students to know various components in tall buildings.

COB 4 : To impart the knowledge on design concepts of design tall buildings considering all loading effects.

COB 5 : To enable the students to evaluate the performance of tall structures for strength and stability.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 : Explain different types of concrete used in construction of tall buildings.

CO 2 : Calculate various loads acting on buildings.

CO 3 : Summarize the behaviour of various structural systems.

CO 4 : Design various structural systems for tall buildings.

CO 5 : Analyze stability of structural members in tall buildings.

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UNIT I  
Design Philosophies and Materials  

UNIT-II  
Gravity and Lateral Loading  

UNIT-III  
Behaviour of Structural Systems  

UNIT-IV  
Analysis and Design  
Modelling for approximate analysis – Accurate analysis and reduction techniques – Analysis of structures as an integral unit – Analysis for member forces – Drift and twist – Computerized 3D analysis – Design for differential movement – Creep and Shrinkage effects – Temperature effects and fire Resistance.

UNIT-V  
Stability Analysis  

Text Books:

Reference Books:
Web Links:
   2. https://www.bdcnetwork.com/5-innovations-high-rise-building-design

*****
BRIDGE ENGINEERING
(PROFESSIONAL ELECTIVE - V)

VII Semester

Course Code: 171CE7E13

Course Objectives:

COB 1: To facilitate the students to know about various components of bridges and various types with standard loading developed by IRC.

COB 2: To familiarize the students with the knowledge on theory and design of various types of bearings and joints in bridge structures.

COB 3: To enable the students to provide a lucid exposition of the theory and design of RC slab culverts and T-Beam.

COB 4: To impart the knowledge on the concepts of plate girder bridges and composite bridges.

COB 5: To equip the students with the knowledge on theory and design of substructures of a bridge.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Make use of standard loading specifications for bridge design followed by IRC codes.

CO 2: Design various types of bearings and joints in bridge structures.

CO 3: Analyze and perform design of RC slab culverts and RC T-Beam Bridges.

CO 4: Design of plate girder bridges and composite bridges.

CO 5: Design various elements of sub-structures of a bridge.

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UNIT I
Introduction:
Importance of site investigation in Bridge design – Design discharge – Linear water way scour depth – Highway Bridge loading standards – Impact factor – Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

Box Culvert:
General aspects – Design loads – Design of Box culvert subjected to RC class AA tracked vehicle only.

Bridge Bearings:

UNIT II
Deck Slab Bridge:
Introduction – Effective width method of Analysis Design of deck Slab Bridge (Simply supported) subjected to class AA Tracked Vehicle only by Courban’s method

UNIT III
Beam & Slab Bridge (T-BEAM BRIDGE):
General features – Design of interior panel of slab – Pigeaud’s method – Design of a T-beam bridge subjected to class AA tracked vehicle only by Courban’s method.

UNIT IV
Plate Girder Bridge:
Introduction – elements of a plate girder and their design – Design of a Deck type welded plate girder

Composite Bridges:
Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders including shear connectors

UNIT V
Piers & Abutments:

Text books:

IS Code Books:
1. IRC-6:2010 – Loading specifications
2. IRC-112:2011 – Design specifications
Reference Books:

Web Links:
1. https://nptel.ac.in/courses/105105165/
2. https://nptel.ac.in/courses/105106113/55
3. https://www.aboutcivil.org/bridge-design-construction-video-tutorials.html

*****
ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT  
(PROFESSIONAL ELECTIVE - V)

VII Semester  
Course Code: 171CE7T14

Course Objectives:

COB 1: To impart the knowledge on basic concepts of Environmental Impact Assessment.
COB 2: To equip the students with the knowledge of various EIA methodologies.
COB 3: To enable the students to assess the impacts of developmental activities on various sectors of environment.
COB 4: To familiarize the students with the environmental risk assessment.
COB 5: To enlighten the students with the knowledge on environmental legislation and case studies.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Explain the basic concepts of EIA.
CO 2: Classify the various EIA methodologies.
CO 3: Illustrate the systematic procedure of assessment of impacts of developmental activities on various sectors of environment.
CO 4: Describe the concept of risk assessment and management in EIA.
CO 5: Apply the knowledge of EIA to day to day activities.

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UNIT I
Basic concepts of Environmental Impact Assessment:
Elements of EIA, factors affecting EIA, Initial environmental Examination, life cycle analysis, Preparation of Environmental Base map, Classification of environmental parameters, role of stakeholders in the EIA preparation, stages in EIA, EIS and EMP.

UNIT II
Environmental Impact Assessment Methodologies:

UNIT III
Impact of Developmental Activities on soil, water, air and biological environment:
Introduction and Methodology, Delineation of study area, Identification of activities, Procurement of relevant quality of the sample, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures, Systematic approach in assessment of Impact of development Activities on Vegetation and wildlife.

UNIT IV
Environmental Risk Assessment and Risk management in EIA:
Treatment of uncertainty, key stages in performing an Environmental Risk Assessment, advantages of Environmental Risk Assessment, Application of remote sensing and GIS for EIA.

UNIT V
Environmental Legislation and Environmental Audit:
EIA notification by Ministry of Environment and Forest (Govt. of India), provisions and procedure for environmental clearance, Environmental legislation objectives, Evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.
Case studies and Preparation of Environmental impact assessment statement for various Industries.

Text Books:

Reference Books:
3. Environmental Pollution and Control, Dr H.S. Bhatia – Galgotia Publication (P) Ltd., Delhi.
Web Links:
1. https://nptel.ac.in/courses/120108004

*****
WATER RESOURCES SYSTEMS PLANNING
(PROFESSIONAL ELECTIVE – V)

VII Semester

Course Code: 171CE7E15

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Course Objectives:

COB 1: To impart the knowledge on optimization models in planning and management of water resources systems.

COB 2: To enable the students to know various linear programming models.

COB 3: To impart the students with knowledge on dynamic programming principles.

COB 4: To equip the students with the knowledge on non-linear optimization techniques.

COB 5: To familiarize the students with basic concepts on water resources economics, simulation and management techniques.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Explain the concepts of systems analysis and role of optimization models.

CO 2: Illustrate various linear programming models in water resources system management.

CO 3: Demonstrate various dynamic programming principles for resource allocation in water resources systems.

CO 4: Examine the use of non-linear optimization techniques in design problems of water resources systems.

CO 5: Apply the water resources economics, simulation and management techniques in water resources systems planning.

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UNIT I
Introduction
Concepts of system analysis - definition - systems approach to water resources planning and management - role of optimization models - objective function and constraints - types of optimization techniques.

UNIT II
Linear programming
Formulation of linear programming models - graphical method - simplex method - application of linear programming in water resources - revised simplex method - duality in linear programming - sensitivity analysis.

UNIT III
Dynamic programming
Principles of optimality - forward and backward recursive dynamic programming - curse of dimensionality - application for resource allocation.

UNIT IV
Non-linear optimization techniques
Classical optimization techniques - Lagrange methods - Kuhn-Tucker conditions - Search techniques - overview of Genetic Algorithm

UNIT V
Water Resources Economics, Simulation and management
Basics of engineering economics - economic analysis - conditions of project optimality - benefit and cost analysis - Application of simulation techniques in water resources - planning of reservoir system - optimal operation of single reservoir system - allocation of water resources - optimal cropping pattern - conjunctive use of surface and sub-surface water resources.

Text Books:
5. Water Resources system planning by SK.Jain and V.P. Singh, Elsevier Science publisher, 2003

Reference Books:
Web Links:
5. http://nptel.ac.in/courses/105108081/

*****
ENVIRONMENTAL ENGINEERING LAB

VII Semester

Course Code: 171CE7L08

Course Objectives:

COB 1: To enable the students to assess the quality of water with respect to various physical, chemical and biological parameters.

COB 2: To equip the student with the knowledge on significance of characteristics of water and waste water.

COB 3: To familiarize the students with the estimation of various characteristics of water.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Determine the chemical quality parameters of water.

CO 2: Estimate the extent of pollution in the given waste water by comparing with the IS – 10500 - 2012 drinking water standards.

CO 3: Determine the treatment methods to be followed in order to supply the water for public consumption.

CO 4: Estimate the level of treatment methods to be followed for the given waste water sample.

CO 5: Judge whether the given waste water sample can be disposed into the environment.

Mapping of Course Outcomes with Program Outcomes:

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List of Experiments:
1. To determine the physical properties of the given water samples (colour, odour, temperature and turbidity).
2. To determine pH and acidity of the given water samples.
3. To determine total alkalinity of the given water samples.
4. To estimate the total, calcium and magnesium hardness in the given water samples.
5. To determine total dissolved solids (TDS) and electrical conductivity (EC) of the given water sample.
6. To determine optimum coagulant dose needed in water treatment using Jar test.
7. To estimate the amount of dissolved oxygen (DO) content and biochemical oxygen demand (BOD) of the given water and wastewater samples respectively.
8. To determine the total settleable solids present in the given water sample using Imhoff cone set up.
9. To determine the chemical oxygen demand (COD) of the given waste water sample.
10. To determine the total nitrogen and phosphorous content present in the given waste water sample.

List of Augmented Experiments:
(Any 2 experiments to be conducted from the following)

11. To determine the total iron content of the given water sample.
12. To determine the chloride content in the given water sample.
13. To determine the bacteriological population in the given water sample by most probable number (MPN) method.

Reference Books:
2. Standard methods of analysis of water and waste water, APHA.

Web Links:
2. http://www.who.int/water_sanitation_health
3. https://www.thermofischer.com>industrial
GIS AND CAD LAB

VII Semester

Course Code: 171CE7L09

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Course Objectives:

COB 1: To equip the students with the knowledge on image processing and GIS software.
COB 2: To familiarize the students with structural analysis and design software.
COB 3: To impart the knowledge of digitization, and creation of thematic map from topographs.
COB 4: To equip the students with the knowledge on analysis and design of 2D and 3D frame.
COB 5: To enable the students to design the concrete and steel structures.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Extend the knowledge on GIS software.
CO 2: Classify thematic map, digitize and extract important features from satellite images.
CO 3: Develop digital elevation model.
CO 4: Analyze the structural components using software.
CO 5: Design the concrete and steel structures using software.

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List of Experiments (WEEK 1 TO 12)

1. Detailed introduction to GIS software and digitization of Map/Toposheet.
2. Analysis and Design of simply supported and cantilever beam using CAD.
3. Creation of thematic maps using GIS software.
4. Analysis and Design of continuous beam using CAD.
5. Estimation of features and interpretation using GIS software.
6. Analysis and Design of 2D and 3D frame using CAD.
7. Develop DEM and DTM using GIS software.
8. Analysis and design of linear transmission Tower using CAD.
9. Simple applications of GIS in water Resources Engineering & Transportation Engineering.
10. Wind analysis of multistoried building using CAD.

List of Augmented Experiments: (Week 13 – Week 16)
(Any two of the following experiments can be performed)

11. Seismic analysis of 3D frame using CAD.
13. Estimation and comparison of rainfall data and ground water resource using GIS software (Case studies).

GIS-SOFTWARES:

1. Arc GIS 10.5
2. ERDAS 2014
3. Geomatica
   Any one or Equivalent

COMPUTER AIDED DESIGN AND DRAWING - SOFTWARE:

1. STAAD PRO / Equivalent/
2. Robot structural Analysis.
3. ETABS.

Reference Books:


Web Links:

2. https://usharama.edu.in/gisCadLab
3. https://libguides.mit.edu/gis/computers
INDUSTRY ORIENTED (INTERNSHIP) MINOR PROJECT

VII Semester

Course Code: 171EC7P01

Guidelines:
1. The mini-project is a team activity comprises of 3-4 students.
2. The mini-project mainly focuses on the field oriented experience and also software related any civil engineering projects.
3. The mini project relates to Surveying, Engineering materials, Structural, Transportation, Environmental and Water Resources Engineering.
4. Mini Project should cater to a small system required in laboratory or real life.
5. Art work and Layout should be made using Auto-CAD software. Based on the project the advanced softwares like STAAD.pro, ETABS, REVIT, Arc.GIS etc., can be used for effective completion of the project.
6. After interactions with course coordinator and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of mini project.
7. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
8. The student is expected to exert on design, development and testing of the proposed work as per the schedule.

Internship Objectives:

COB 1: To make students develop employer-valued skills such as teamwork and attention to detail.

COB 2: To expose students to the professional demeanor expected from an employee in private/public sector companies

COB 3: To enhance student's knowledge of particular area(s) of engineering.

COB 4: To enable students to find professional role models or mentors who can provide inspiration in the early stages of their employment

COB 5: To make students develop work ethics and commitment for social responsibility.

Internship Outcomes:

At the end of the Internship, Student will be able to:

CO 1: Outline the working environment and professional ethics in an industry
CO 2: Relate with real time tools used in industries
CO 3: Apply respective domain knowledge to understand an industrial process
CO4: Utilize an industrial process involved in delivering/developing a final service/product for project building
CO 5: Analyze the relevance of their course curriculum with that used in industries
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URBAN TRANSPORTATION PLANNING
(PROFESSIONAL ELECTIVE – VI)

VIII Semester

Course Code: 171CE8E16

Course Objectives:
COB 1: To equip students with knowledge on Variables, Travel Attributes.
COB 2: To impart knowledge on collection of data by different surveys.
COB 3: To enable the students to know the trip purpose, factors governing the trip distribution.
COB 4: To familiarize the students with transport mode choice analysis and traffic assignment.
COB 5: To enable the students to understand master plan preparation and corridor identification.

Course Outcomes:
At the end of the Course, Student will be able to:
CO 1: Describe the transport planning process and variables.
CO 2: Interpret the sampling techniques and accuracy checks.
CO 3: Explain the trip generation and distribution.
CO 4: Estimate the mode choice and traffic assignment.
CO 5: Assess the master plan and corridor deficiency.

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UNIT -I
Transportation Planning Process:

UNIT -II
Transportation Planning Survey:
Transport survey – definition of study area and zoning– road side interviews – public transport surveys – Home interview survey and cordon line surveys – inventory of existing transport facilities – land use and economic activities.

UNIT –III
Trip Generation:
Introduction – trip purpose – factors governing trip generation – Trip Generation Analysis – multiple linear regression analysis – Category Analysis

Trip Distribution:
Presentation of Trip distribution data – PA matrix to OD matrix – Growth factor methods – Gravity model and its calibration – opportunities model

UNIT-IV
Modal split:

Traffic assignment:
Diversion curves; basic elements of transport net – all-or-nothing capacity – restraint techniques – reallocation of assigned volumes equilibrium assignment.

UNIT -V
Corridor identification:

Text Books:
3. ‘Fundamentals of Transportation Planning’ by Papacostas, Tata McGraw Hill
Reference Books:

Web Links:
1. https://nptel.ac.in/courses/105107067/

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SOIL DYNAMICS AND FOUNDATIONS  
(PROFESSIONAL ELECTIVE – VI)

VIII Semester

Course Code: 171CE8E17

Course Objectives:

COB 1: To enable the students to derive free and forced vibrations with and without damping for single degree freedom system.

COB 2: To familiarize the students with the knowledge on dynamic soil properties and one dimensional wave motion using wave propagation theory.

COB 3: To equip the students with the knowledge on analysis of machine foundations.

COB 4: To facilitate the students to know about the design of foundations for reciprocating and impact type machines.

COB 5: To impart the knowledge on basic concepts of vibration isolation.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Deduce the equations for free and forced vibrations with and without damping for single degree freedom system.

CO 2: Solve one dimensional wave motion using wave propagation theory.

CO 3: Analyze machine foundations.

CO 4: Design foundations for reciprocating, impact type machines.

CO 5: Illustrate the basic concepts of vibration isolation.

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UNIT I
Theory of vibrations:
Basic definitions – free and forced vibrations with and without damping for single degree freedom system- Resonance and it’s effects – magnification – Logarithmic decrement – Soil system – Natural frequency of foundation – Barkan’s and IS methods – pressure bulb concept – Pauw’s Analogy.

UNIT II
Wave propagation:
One dimensional wave motion – propagation in an elastic infinite medium – wave propagation in an elastic half space – propagation of flexural waves in beams on elastic foundations.
Dynamic Soil Properties:
Field and Laboratory methods of determination – Up hole, Down hole and cross hole methods – Cyclic plate load test – Block vibration test – Determination of Damping factor.

UNIT III
Machine Foundations:
Introduction – Types – Design criteria – Permissible amplitudes and Bearing pressure – Degrees of freedom – Analysis under different modes of vibration of block foundation

UNIT IV
Design of Foundations for Reciprocating and Impact Machines:
Degrees of freedom – analysis under different modes of vibration – codal provisions for design and construction of foundations for reciprocating machine and impact machine.

UNIT V
Vibration Isolation:

Text books:

Reference books:
Web Links:
1. nptel.ac.in/courses/105101005
2. https://nptel.ac.in/courses/105101083/36
3. https://www.slideshare.net/LATIFHYDERWadho/soil-dynamics

*****
SOLID AND HAZARDOUS WASTE MANAGEMENT
(PROFESSIONAL ELECTIVE - VI)

VIII Semester
Course Code: 171CE8E18

Course Objectives:
COB 1: To impart the knowledge on composition of municipal solid waste.
COB 2: To equip the students with the knowledge on methods of collection and optimization of collection routing of municipal solid waste.
COB 3: To familiarize the students with different unit operations in processing of municipal solid waste.
COB 4: To enable the students to know the criteria for selection of landfill.
COB 5: To enable the students to identify the hazardous waste and make use of treatment procedures.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Interpret the composition and characteristics of municipal solid waste.
CO 2: Illustrate different methods of collection of municipal solid waste.
CO 3: Choose the criteria for selection of landfill.
CO 4: Classify the solid waste and select suitable composting facility.
CO 5: Apply different methods of treatment and disposal for Hazardous wastes.

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UNIT I
Introduction:

UNIT II
Collection and Transport of Solid Waste:
Type and methods of waste collection systems – analysis of collection system – Optimization of collection routes – alternative techniques for collection system.
Transfer and Transport:
Need for transfer operation – transport means and methods – transfer station types and design requirements – Separation, processing and transformation of solid waste.

UNIT III
Processing and Disposal:
Landfills:
Site selection, design and operation, drainage and leachate collection systems – designated waste landfill remediation.

UNIT IV
Hazardous Waste Management:

UNIT V
Hazardous waste treatment and Design:
Hazardous waste treatment technologies – Design and operation of facilities for physical, chemical and thermal treatment of hazardous waste – Solidification, chemical fixation and encapsulation, incineration - Hazardous waste landfills - Site selection, design and operation – remediation of hazardous waste disposal sites.

Text books:
Reference books:
1. Introduction to Transportation Planning, Bruton M.J. Hutchinson of London, 2nd edition 2001

Web Links:
2. https://www.cartercenter.org/resources/pdfs/health/ephti/library
3. https://www.rand.org/content/dam/rand/pubs/commercial_books

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AIR POLLUTION AND CONTROL
(PROFESSIONAL ELECTIVE - VI)

VIII Semester
Course Code: 171CE8E19

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Course Objectives:

COB 1: To impart the knowledge on basic concepts of air pollution.
COB 2: To familiarize the students with the concepts of plume behaviour in different atmospheric conditions.
COB 3: To equip the students with the knowledge on sampling and analysis of air pollutants.
COB 4: To enable the students to know about the working principles of particulate and gaseous control technologies.
COB 5: To familiarize the students with the strategic planning for control of air pollution.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Interpret the various ambient air quality parameters.
CO 2: Examine the plume behaviour in prevailing atmospheric conditions.
CO 3: Explain the various methods related to sampling and analysis.
CO 4: Choose the appropriate air pollution control devices.
CO 5: Apply suitable particulate and gaseous control measures for an industry.

Mapping of Course Outcomes with Program Outcomes:

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UNIT I
Air Pollution:
Definition – Sources and classification of Air Pollutants – indoor air quality – Effects of air pollution on health of Human & Animals, vegetation & materials, Global effects of air pollution - Carbon Credits and Carbon Trade.

UNIT II
Meteorology and Air Pollution:

UNIT III
Control of Particulate Pollutants:

UNIT IV
Control of Gaseous Pollutants:
Process and equipment for the removal of gaseous pollutants by chemical methods – Design and operation of absorption and adsorption equipment- combustion and condensation equipment.

UNIT V
Control of Air and Noise Pollution:

Text books:

Reference books:
2. Air Pollution control–A design approach, C David Cooper and F.C. Alley, 4th Edition
Web Links:
1. https://nptel.ac.in/courses/103107084
3. http://home.iitk.ac.in/~anubha/APC

*****
ELECTRONIC INSTRUMENTATION
(OPEN ELECTIVE)

VIII Semester

Course Code: 171CE8O01

Course Objectives:

COB 1  To enable the students to know the principle of operation and working of different types of instruments.
COB 2  To equip the students with the knowledge on principle of operation and working of Signal Generators, Analyzers.
COB 3  To impart knowledge on the principle of operation and working of CRO.
COB 4  To familiarize the students with the principle of operation and working of various types of AC bridges and Q-meter.
COB 5  To enrich the students with the knowledge on the principle of operation and working of various types of Transducers and measurement of physical parameters force, pressure, velocity and displacement.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1  Explain about the instrument to be used based on the requirements.
CO 2  Demonstrate different signal generators and analyzers.
CO 3  Illustrate the design of oscilloscopes for different applications.
CO 4  Develop different transducers for measurement of different parameters
CO 5  Describe the design of Data acquisition systems.

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UNIT I
Performance characteristics of instruments:

UNIT II
Signal Generator:
Fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers

UNIT III
Oscilloscopes:
CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, Lissajous method of frequency measurement.

UNIT IV
AC Bridges:

UNIT V
Transducers:
Active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Measurement of physical parameters force, pressure, velocity and displacement.

Text Books:

Reference Books:
Web Links:
8. https://nptel.ac.in/courses/108106070/
9. https://nptel.ac.in/downloads/117101054/

****
DATABASE MANAGEMENT SYSTEMS
(Common to CE, ME & ECE)
(OPENS ELECTIVE)

VIII Semester

Course Code: 171CE8002

L T P C
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Course Objectives:

COB 1: To discuss the basic concepts of database systems and its architectures.
COB 2: To enable the students to learn various data models.
COB 3: To illustrate the mechanisms involved in normalization of relational databases.
COB 4: To make use of SQL statements for performing operations on databases.
COB 5: To impart knowledge on transaction management and concurrency controls.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Summarize various database characteristics.
CO 2: Identify various database architectures.
CO 3: Interpret relational database using SQL.
CO 4: Examine issues in data storage and query processing for appropriate solutions.
CO 5: Make use of normalization techniques for database design.
CO 6: Illustrate the mechanisms of transaction management.
CO 7: Build database system for real world problems.

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UNIT I:
Introduction to Databases:
Characteristics of database approach, advantages of using the DBMS approach.
Overview of Database Languages and Architectures:
Data models, schemas and instances, three schema architecture and data independence,
database system environment, centralized and client/server architectures for DBMSs,
classification of database management system.
SQL: Data Definition, Constraints and Basic Queries and Updates:
SQL data definition – DDL commands and data types, specifying constraints in SQL,
INSERT, DELETE and UPDATE statements in SQL, basic retrieval queries in SQL.

UNIT II:
Introduction to Database Design:
Database Design and ER Diagrams, Entities, Attributes and Entity sets, Relationships and
Relationship sets, Additional features of the E-R Model, Conceptual Design with the ER-
Model
The Relational Model:
Introduction to the relational model, Integrity constraints over relations, enforcing
integrity constraints, querying relational data, logical database design-ER to Relational.

UNIT III:
Relational Algebra and Calculus:
Preliminaries, relational algebra, relational calculus, expressive power of algebra and
calculus.
Schema Refinement and Normal Forms:
Introduction to schema refinement, functional dependencies, reasoning about FDs, Normal
forms (1NF, 2NF, 3NF and BCNF), properties of decompositions, normalization
(decomposition into BCNF and 3NF), schema refinement in database design, other kinds
of dependencies

UNIT IV:
Overview of Transaction Management & Concurrency Control:
Transaction Management:
The ACID properties, transactions and schedules, concurrent execution of transactions,
lock based concurrency control, performance of locking, and transaction support in SQL,
introduction to crash recovery.
Concurrency Control:
2PL, Serializability and recoverability, introduction to lock management, lock
conversions, dealing with deadlocks, specialized locking techniques, concurrency control
without locking.
UNIT V:
Storage:
Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing –Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization.

Text books:

Reference Books:

Web Links:
1. https://nptel.ac.in/courses/103107084
3. http://home.iitk.ac.in/~anubha/APC

*****
ALTERNATIVE ENERGY SOURCES
(Common to CE & ECE)
(Open Elective)

VIII Semester

Course Code: 171CE8O03

Course Objectives:

COB 1: To explain the concept of renewable energy resources and solar radiation.
COB 2: To outline utilization of solar energy source for both domestic and industrial applications.
COB 3: To impart the knowledge of wind energy and Bio-mass resources.
COB 4: To make the students know various conversion principles and techniques of various renewable resources.
COB 5: To enable the students to know the principles behind the energy conversions.

Course Outcomes:
At the end of the Course, Student will be able to:

CO 1: Intrepet renewable energy sources and solar radiation.
CO 2: Apply the knowledge of solar principles for its applications.
CO 3: Discuss the working principles of wind and Bio-mass energy resources.
CO 4: Illustrate the techniques and conversion principles of Geothermal and tidal energy resources.
CO 5: Make use of working principles in energy conversion.

Mapping of Course Outcomes with Program Outcomes:

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UNIT I
**Principles of Solar Radiation:**
Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power - Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT II
**Solar Energy Collection:**
Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

**Solar Energy Storage and Applications:**
Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications - solar heating/cooling techniques, solar distillation and drying, Photovoltaic energy conversion.

UNIT III
**Wind Energy:**
Sources and potentials, horizontal and vertical axis windmills, performance characteristics.

**Bio-Mass:**

UNIT –IV
**Geothermal Energy:**
Resources, types of wells, methods of harnessing the energy, potential in India.

**OTEC:**
Principles, utilization, setting of OTEC plants, thermodynamic cycles.

**Tidal and Wave Energy:**
Potential and conversion techniques, mini-hydel power plants, their economics.

UNIT-V
**Direct Energy Conversion:**
Need for DEC, Carnot cycle, limitations, Principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principle, faraday’s laws, thermodynamic aspects, selection of fuels and operating conditions.

**Text books:**
Reference books:


Web Links:

1. https://nptel.ac.in/courses/112104225/22
2. https://nptel.ac.in/courses/108105058/
3. https://www.eia.gov/energyexplained/?page=renewable_home

*****
WASTE WATER MANAGEMENT
(Common to CE & ECE)
(Open Elective)

VIII Semester

Course Code: 171CE8O04

Course Objectives:

COB 1: To make the students know the importance of waste water management.
COB 2: To impart the knowledge on estimation of waste water flow rate or discharge.
COB 3: To equip the students with basics of waste water characterisation
COB 4: To enrich the students to acquire knowledge on the principles and methods of treatment of waste water.
COB 5: To familiarize the students with various ways of disposal methods of treated effluent and its recycling.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Summarize the importance of sanitation.
CO 2: Find the rate of sewage flow.
CO 3: Identify the various characteristics of sewage.
CO 4: Outline various waste water treatment technologies.
CO 5: Explain the different treated effluent disposal methods.
CO 6: Illustrate the need of waste water recycling.

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UNIT I
Introduction:

UNIT II
Sewage Flow and Pumping:

UNIT III
Sewage Analysis and Treatment:

UNIT IV
Secondary Treatment:

UNIT V
Tertiary Treatment and Disposal:

Text books:
Reference books:

Web Links:
1. http://nptel.ac.in/courses/105105048/2
2. http://web.iitd.ac.in/~arunku/files/CVL100_Y16
3. http://www.civil.iitm.ac.in/dwwm/sites/default/files/presentations

****
FUNDAMENTALS OF LIQUEFIED NATURAL GAS
(OPEN ELECTIVE)

VIII Semester

Course Code: 171CE8O05

Course Objectives:

COB 1: To impart the knowledge of world and Indian scenario of LNG industry.
COB 2: To demonstrate the liquefaction technologies of LNG.
COB 3: To impart the knowledge on supporting functional units of LNG plants.
COB 4: To help the students learn about LNG shipping industry.
COB 5: To impart knowledge on major equipment and safety aspects of LNG industry.

Course Outcomes:
The students will be able to:

CO 1: Explain the LNG value chain.
CO 2: Classify the different liquefaction technologies of LNG.
CO 3: Describe the components of LNG receiving terminals.
CO 4: Summarize LNG storage and transportation facilities.
CO 5: Identify major equipment and safety aspects of LNG industry.

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UNIT I

Introduction

Overview of LNG industry: History of LNG industry – Base load LNG – Developing an LNG Project – World and Indian Scenario – Properties of LNG.
UNIT II
Liquefaction Technologies:
Propane precooled mixed refrigerant process – Description of Air products C₃MR LNG process – Liquefaction – LNG flash and storage.
Cascade process: Description of Conocophillips optimized cascade (copoc) process – Liquefaction – LNG flash and storage.

UNIT III
Supporting Functional Units in LNG Plants:

UNIT IV
Receiving Terminals:
Receiving terminals in India – Main components and description of marine facilities – storage capacity – Process descriptions.
Integration with adjacent facilities – Gas interchangeability – Nitrogen injection – Extraction of C₂⁺ components.
LNG Shipping Industry
LNG Shipping Industry: LNG fleet – Types of LNG ships – Moss – Membrane – prismatic; Cargo measurement and calculations.

UNIT V
Major equipment in LNG industry:
Cryogenic heat exchangers: Spiral – Wound heat exchangers – Plate & fin heat exchangers – Cold boxes; Centrifugal compressors – Axial compressors – Reciprocating compressors; LNG pumps and liquid expanders – Loading Arms and gas turbines.
Vaporizers:
Submerged combustion vaporizers- Open rack vaporizers–Shell and tube vaporizers: direct heating with seawater, and indirect heating with seawater. Ambient air vaporizers: Direct heating with ambient air – Indirect heating with ambient air. LNG tanks.
Safety, Security and Environmental Issues:

Text books:
1. LNG: Basics of Liquified Natural Gas, Stanley Huang, HwaChiu and Doug Elliot, 1st Edition, PETEX, 207
Reference books:

Web Links:

*****
GREEN FUEL TECHNOLOGIES  
(Common to CE & ECE)  
(Open Elective)  

VIII Semester  
Course Code: 171CE8O06  

Course Objectives:  
COB 1: To equip the students to know the importance of Green Fuels and their technologies in place of conventional fossil fuels for sustainable development.  
COB 2: To enable the students to know the production of transport fuels that can replace or supplement the conventional transportation of fuels.  
COB 3: To impart the knowledge on the scientific and technological concepts developed for Green Fuel Technologies.  

Course Outcomes:  
At the end of the Course, Student will be able to:  
CO 1: Summarize the different Coal Liquefaction techniques.  
CO 2: Identify the process steps involved in conversion of lignocellulosic materials into ethanol fuel  
CO 3: Analyze the Chemistry and Catalysts of Fischer-Tropsch synthesis in conversion of Natural gas into liquid fuels  
CO 4: Evaluate the chemical reaction mechanisms, catalysts and process technologies of Methane synthesis.  
CO 5: Outline the basic concepts of fuel cell technologies  

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UNIT I
Clean Liquid Fuels From Coal:

UNIT II
Ethanol From Lignocellulosic:

UNIT III
Liquid Fuels From Natural Gas:
Introduction – Occurrence and Resources – Composition – Natural Liquids – Conversion of Natural Gas to Liquids: Syngas production, Fischer – Tropsch Process

UNIT IV
Methanol Synthesis From Syngas:
Introduction- Chemistry of Methanol Synthesis: CO and CO$_2$ Hydrogenation, Chemical reactions from under extreme syngas conditions, Chemical Equilibrium – Methanol synthesis technologies: Conventional ICI’s 100 atm, HaldarTopsoe A/S Low-pressure, Kvaener, Krupp Uhde’s, LurgiÖl-Gas-Chemie GmbH Methanol synthesis Processes.

UNIT V
Fuel Cells:

Text books:

Reference books:

Web Links:
1. https://nptel.ac.in/courses/103105110/m2l13.pdf
GREEN ENGINEERING SYSTEMS  
(Open Elective)

VIII Semester  
Course Code: 171CE8O07

Course Objectives:

COB 1: To highlight the significance of alternative sources of energy, green energy systems.

COB 2: To make the students to know the theory and working principles of probable sources of renewable and Green energy system that are environmental friendly.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1: Describe the principles and working of solar radiation and solar radio collection.

CO 2: Demonstrate the principles and working of solar, wind, biomass, geo thermal, Ocean energies.

CO 3: Illustrate electrical and mechanical systems.

CO 4: Analyze energy efficient processes.

CO 5: Explain green buildings.

Mapping of Course Outcomes with Program Outcomes:

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<th>CO/PO</th>
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Mapping of Course Outcomes with Program Specific Outcomes:

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UNIT I
Introduction:
Solar Radiation:
Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics
Solar Energy Collection:
Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Solar Energy Storage and Applications:
Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT II
Wind Energy:
Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.
Bio-Mass:
Geothermal Energy:
Resources, types of wells, methods of harnessing the energy, potential in India.
Ocean Energy:
OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT III
Energy Efficient Systems:
Electrical Systems:
Energy efficient motors, energy efficient lighting and control, selection of luminaries’, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.
Mechanical Systems:
Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

UNIT IV
Energy Efficient Processes:
Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.
UNIT V

Green Buildings:
Definition, features and benefits. Sustainable site selection and planning of buildings for maximum comfort. Environmental friendly building materials like bamboo, timber, rammed earth, hollow blocks, lime & lime pozzolana cement, agro materials and industrial waste, Ferro cement and Ferro-concrete, alternate roofing systems, paints to reduce heat gain of the buildings. Energy management

Text books:

Reference books:
4. Renewable Energy Technologies, Ramesh & Kumar, Narosa

Web Links:
1. https://onlinecourses.nptel.ac.in/noc17_me33
2. https://nptel.ac.in/courses/105107176/20
4. https://onlinecourses.nptel.ac.in/noc18_ge09/course

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MAJOR PROJECT

VIII Semester

Course Code : 171EC8P02

Guidelines for Major Project:

The objective of this project work is to enable the student to take up investigative study in the field of Civil Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the department for four to six students in a group, under the guidance of a supervisor. This is expected to provide a good initiation for the students in R&D work. The assignment to normally include:

1. Survey and study of published literature on the assigned topic.
2. Working out a preliminary Approach to the Problem relating to the assigned topic.
4. Preparing a Written Report on the Study conducted for presentation to the Department
5. Review and finalization of the Approach to the Problem relating to the assigned topic.
6. Preparing an Action Plan for conducting the investigation, including team work.
7. Detailed Analysis/Modeling/Simulation/Design/Problem Solving/Experiment as needed.
8. Final development of product/process, testing, results, conclusions and future directions.
9. Preparing a paper for Conference presentation/Publication in Journals, if possible.
10. Preparing a Dissertation in the standard format for being evaluated by the Department.
11. Final Project Presentation before a Departmental Committee.

Major Project Objectives:

COB 1 : To provide students an opportunity to develop firmware or utilize literature related to their own degree course to address a societal problem
COB 2 : To make students identify their domain of competence to choose an appropriate project topic to demonstrate engineering skills acquired
COB 3 : To apply Engineering knowledge to solve technical problems
COB 4 : To collaborate with other departments to apply inter disciplinary knowledge for project completion
COB 5 : To work as a team under the guidance of a supervisor in pursuing a common goal

Major Project Outcomes:

At the end of the Project, student will be able to:

CO 1 : Demonstrate management skills required for project development
CO 2 : Illustrate the problem statement and scope of the project clearly
CO 3 : Make use of a proper methodology in solving problems related to a project
CO 4 : Analyze data into meaningful information for a project using relevant tools
CO 5 : Adapt to work independently and ethically to effectively present the results in written and oral formats
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