Bapatla Engineering College

(Autonomous)

BAPATLA

B.Tech
Civil Engineering
Curriculum Effective from A.Y. 2018-19 (R18 Regulations)

SYLLABUS BOOK
Four Year B.Tech.

Bapatla Engineering College:: Bapatla

(Autonomous under Acharya Nagarjuna University)
(Sponsored by Bapatla Education Society)
BAPATLA-522102, Guntur District, A.P.
www.becbapatla.ac.in

The Vision and Mission of the Institute

Vision:

- To build centers of excellence, impart high quality education and instill high standards of ethics and professionalism through strategic efforts of our dedicated staff, which allows the college to effectively adapt to the ever-changing aspects of education.
- To empower the faculty and students with the knowledge, skills and innovative thinking to facilitate discovery in numerous existing and yet to be discovered fields of engineering, technology and interdisciplinary endeavors.

Mission:

- Our Mission it to impart the quality education at par with global standards to the students from all over India and in particular those from the local and rural areas.
- We continuously try to maintain high standards so as to make them technologically competent and ethically strong individuals who shall be able to improve the quality of life and economy of our country.

The Vision and Mission of the Department

The Vision:

- The goal is to educate the students through active student-teacher engagement, enabling departmental graduates to become self-sustaining individuals who can tackle global challenges and create employment opportunities.

The Mission:

- **M1:** To maintain and elevate technical competence in students to drive excellence, contributing to their working organization's success in a dynamic and competitive landscape.
- **M2:** To empower the students for succeeding in thriving careers while maintaining a harmonious work culture. It inculcates the spirit of individual growth and collaboration, creating an environment where both personal and collective successes are prioritized.
- **M3:** To cultivate top-tier academic and administrative leaders. The department is committed to identify, nurture and empower students who will excel in leadership roles within the academic and administrative domains, contributing to the success of the organization.

Program Educational Objectives (PEO's)

PEO-I: The graduates will be rigorously trained to build a successful career in the field of Civil Engineering or pursue higher studies by acquiring knowledge in mathematics, basic sciences, and the fundamentals of Civil Engineering.

PEO-II: The graduates will be trained to perform as professional engineers by planning, analyzing, and optimally designing Civil Engineering systems with a focus on social awareness and responsibility.

PEO-III: The graduates will be trained to demonstrate professionalism, an ethical approach, strong communication skills, and teamwork in delivering their responsibilities with excellence and readiness to tackle the challenges of the current scenario.

PEO-IV: The graduates shall acquire the skills necessary to become successful entrepreneurs, and they will also be taught to cultivate an attitude of continuous learning with a research-oriented mind-set.

Program Specific Outcomes (PSOs).

PSO1: Analyze the Civil Engineering problems by applying the knowledge of the basic sciences, Engineering skills, mathematics and computational tools.
PSO2: Design and execute the high quality Civil Engineering Projects by taking into account the threshold economics, environmental, professional ethics, and health and safety factors involved in the infrastructure development.
PSO3: Apprise Communication skills and leadership attributes towards the team work and also involve in research and development that promotes sustainable solution to the practical reality in dealing with Civil Engineering Problems.
PSO4: Enhance the practical knowledge of Civil Engineering field through the laboratory and field investigations in regular consultancy works.

PROFILE OF THE COLLEGE

Year of Start	1981
Courses offered	**B.Tech.:** 1. Civil Engineering (CE), 2. Computer Science & Engineering (CSE), 3. Electronics & Communication Engineering (ECE), 4. Electrical & Electronics Engineering (EEE), 5. Electronics & Instrumentation Engineering (EIE), 6. Information Technology (IT), 7. Mechanical Engineering (ME)
	M.Tech.: 1. CE (Structural Engineering), 2. ME (CAD/CAM), 3. ECE (Communication Engineering & Signal Processing), 4. EEE (Power Systems Engineering) & 5. C.S.E.
	Master of Computer Applications (MCA)
	M.Sc.: Mathematics, Physics, Electronics, Chemistry (Organic & Analytical) & Computer Science
Accredited by NBA in the years	07.05.2003 (CE, CSE, ECE, EEE, EIE, ME) 16.03.2007 (CH, CE, CSE, ECE, EEE, EIE, IT & ME) 04.01.2013 (CH, CE, CSE, ECE, EEE, EIE & ME)
Autonomous Status	2010
Accredited by NAAC	2015
Research Park	Innovation Centres: 1) Kuka Robotic Technology Centre 2) Bosch Rexroth Centre of Competence in Automation Technologies 3) Siemens Centre of Excellence 4)Industry Institute Interaction Cell 5) Centre for Continuing Education 6) Incubation Skill Development Cell
Library	Titles: 28,323; Books: 75,317, Journals: International Online-523, Print-30, National Print-90, Educational CDs- 3,237; No. of Staff: 8
Sports facilities	Cricket, Basket Ball, Volley Ball, Ball Badminton, Hockey, Tennis, Foot Ball, Table Tennis, Chess, Caroms & Weight Lifting, Weight Training
Area	30 Acres; Built-up Area: 56102 Sq.mt.
Awards	Best Library (2011, 14, 18), Best laboratory (2009, 10, 11), Best UG Performance College (2011, 12) ,Best Eco Friendly Campus (2016) from Acharya Nagarjuna University
CISCO	A two-way interactive CISCO Digital Media System that is first of its kind in the South Asia Pacific Region at a cost of Rs.3 Crores
Placement/Training	No. of Students placed in 2018-19: 450, No. of Companies visited: 50
Students Activities	Suryodhaya Society for Awakening Community **(SAC)** for social service, Centre or Creative Arts **(CCA)** for cultural & arts and **AWAAZ** the literary club with the main motto of nurturing the inherent talents in the students.
NCC / NSS	NCC (Army wing) unit with 50 cadets. Training will be given by the P.I. Staff from 1(A) Engr. Coy, Guntur. NSS with 300 volunteers.
Facilities	Hostel for girls, Food court, Own Transport, 24x7 power supply, Mineral water, Bank, Post Office

ABOUT THE BAPATLA EDUCATION SOCIETY

BAPATLA EDUCATION SOCIETY was established in the year 1962 registered No: 58/1962 under societies act XXI of 1860 with the objectives to found and run the Educational & Cultural Institutions.

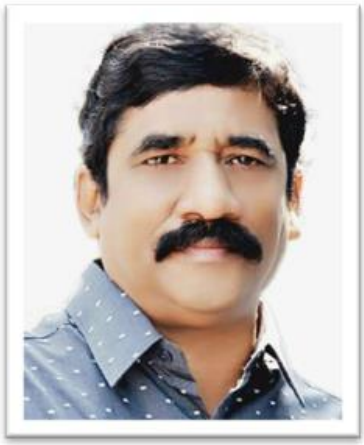
Distinguished Office Bearers of the Society:

Sri M. Seshagiri Rao
President

Sri Paladugu Paparao
Vice President-1

Sri Burle Venkata Siva Rama Krishna
Vice President-2

Sri Manam Nageswara Rao
Secretary



Sri Panguluri Bhavannarayana Chowdary
Jt. Secretary & Correspondent

Sri Chandrapati Venkaiah
Treasurer

The management members are imbued with a spirit of selfless service and believe in the principle of Academic autonomy. Transparency of all financial transactions is strictly adhered and all payments and receipts are through bank transactions only. The Management obtains objective feedback about all aspects of the college and suitably advises and motivates employees in a discrete manner. As a mark of commitment to good management, rules and regulations are applied with justice and fair play. Above all, the management makes all out effort to provide healthy environment on the campus. (Lawns, Greenery including 1000 neem trees and CC roads provided)

MESSAGE FROM PRINCIPAL

Dr. V. Damodara Naidu
B.TECH. (Mech.), M.TECH. (Prod), IIT-Kgp, PH.D., JNTUH

A warm welcome to NAAC accredited Bapatla Engineering College (BEC). The Bapatla Engineering College (Autonomous), one of the seven educational institutions sponsored by the Bapatla Education Society, was established in 1981 with a vision to impart quality technical education and is affiliated to Acharya Nagarjuna University. The College is credited with beautifully laid out and thoughtfully designed. The college has well qualified faculty members from IITs, NITs and reputed universities and has 63 doctorates and more than 60 faculty pursuing Doctorate degrees.

The college is one of the first generation self-financed engineering colleges started in the year 1981 and is regarded as one of the best engineering colleges in the state of Andhra Pradesh.

The teaching learning process in the campus is meticulously planned and effectively implemented by the Heads of the Departments with the able support of the staff members. Continuous evaluation backed by remedial classes, student counseling and parent interactions, form the nucleus of the teaching learning process.

The college is chosen by several world renowned leaders such as Bosch Rexroth Center of Competence in Automation Technologies, Siemens Center of Excellence and Kuka Robotic Technology Center to have their centers of research and innovation under one roof in a unique Research Park established at a cost of Rs.20 Crores.

BEC has taken the class room teaching to world class level through the two-way interactive Digital Media System. We are member of Indian Society for Technical Education (ISTE), Computer Society of India (CSI) etc. Various workshops, seminars, conferences, and Faculty Development Programs (FDP) are conducted through ISTE, and add-on courses and several skill development programs are being organized by the college.

The Department of Training and Placement facilitates the maximum employment opportunities to all the deserving candidates of final and pre-final year students. Many of our Alumni are decorating the top positions at many reputed Multi-National Companies.

We always look at the employability skills and try to perfectly match with the requirements of the

Industry. We impart training in Technical Skills and Life Skills (Soft Skills) as a part of our curriculum to mould and shape the personalities and make the students employable. In order to shape the life skills (soft skills), we are imparting regular training internally and through external resources as well.

We emphasize mainly on Assessment and Evaluation, analyzing the training needs of each candidate, and provide Career Guidance and Counseling. The college provides Training on Business English Communication Skills, Aptitude, Domain skills as needed by the Industry. We promote industrial visits and knowledge sessions to make students familiar with industrial practices. The college encourages students to pursue internships to gain work experience in industries and increase their employability. EDP Cell conducts various programs to develop entrepreneurship culture among students. Over 50 companies visited our college, and more than 65% of eligible students have been placed in various reputed companies for the academic year 2018-19. The students of the college continuously excel in national and international competitive examinations like GATE, IELTS, GRE and TOEFL. We have several Industry MoUs which will help to train faculty and students on latest trends in the technology. Some of the MOUS are listed below:

1.	NASSCOM, Delhi.	CSE/IT
2.	New Mexican State University, NEW Mexico, USA.	All Depts.
3.	Acer Engineers Private Limited, Hyderabad.	Civil Engg.
4.	ICT Academy, Chennai	All Depts.
5.	Caddy Code Solutions Pvt Ltd., Bangalore	IT
6.	APHRDI, Govt. of AP	All Depts.
7.	Sri Lakshmi Ganapathi Engineering Works (to be signed), Tenali.	Mech. Engg.
8.	Satyam Ventures Engineering Services Private Limited, Hyderabad (to be signed)	Mech. Engg.
9.	Construction Industry Development Council, Delhi	Civil Engg.
10.	Microlink Peripheral Controls Pvt. Ltd., Vijayawada	ECE
11.	SRC E-Solutions, Vijayawada	ECE
12.	BT & BT Management consultancy Pvt. Limited. (to be signed)	All Depts.

The college is enriched with Centre for Innovation Incubation and Entrepreneurship (CIIE) and well-established library with Digital Library facility that caters to the needs of student. The institution is a hub of Student clubs that helps them to gratify their creative and innovative minds and weaving social responsibility with leadership qualities among students. The college also provides amenities like subsidized transportation, food court, mineral water, internet, Bank, Post office, Ladies Hostel and Dispensary equipped with an ambulance for the convenience of faculty, staff and students.

We have Governing body (Autonomous), College Academic Council for the continuous improvement of academic performance. We have formed several Committees for Grievance and Redressal, Examination, Admission, Library, Student Welfare, Internal Complaints, Extra-Curricular Activities, Academic Audit, Disciplinary, Research, Sports, Training and Placement,

Alumni Affairs, Anti-Ragging, Campus Facilities, and Maintenance under Planning and Evaluation Committee.

We wish all the students to utilize the infrastructure and the experienced faculty of our institution to equip themselves with emerging technologies and innovative skills that make them lead the nation in to new heights of advancement and development to enrich every citizen's life.

Heads of Departments

Dr. J. S. Rao
Head, Chemical Engg. & COE

Dr. Naga Satish
Head, Civil Engineering

Dr. Shaik Nazeer
Head, CSE

Dr. B. Chandra Mohan, Head, ECE

Dr. N. Rama Devi
Head, EEE

Prof. Ch. Ramesh
Head, EIE

Prof. N. Siva Rama Prasad
Head, IT

Dr. T Nancharaiah
Head, Mechanical Engg.

Dr. P. Vijaya Saradhi
Head, Mathematics

Dr. K. Rama Krishna
Head, Physics

Dr. V. Madhava Rao
Head, Chemistry

Dr. P. AshaMadhavi
Head, English

Mr. K.N. Prasad
Head, MCA

Mr. A. Rama Mohana Rao
Librarian

Mr. Justin Chako
Head, Placements

Dr.T.Chandrasekhara Rao, Warden, Campus Hostel

Mr. Meeravali Shaik
Physical Director

Mr. D. Gopala Krishna
Office Superintendent

Academic Rules & Regulations for B. Tech Program

(Approved by Academic Council & Governing Body of the College held on August 2018)

(Amended in August 2019; Effective for students admitted into First year B.Tech from the academic year 2018-2019 onwards – R18 Regulations).

1. **EXTENT:** All the rules and regulations, specified herein after, shall be read as a whole for the purpose of interpretation and when a doubt arises, the interpretation of the Chairman, Academic Council, Bapatla Engineering College (Autonomous) is final. As per the requirements of the Statutory Bodies, The Principal, Bapatla Engineering College (Autonomous), shall be the Chairman of the College Academic Council.

1.1 DURATION OF THE PROGRAMME AND MEDIUM OF INSTRUCTION: The duration of the B.Tech. Programme is for four academic years consisting of two semesters in each academic year. The medium of instruction and examinations is English.

2. **ADMISSIONS:**

2.1 Admission into the First year of any Four Year B.Tech. Programmes of study in Engineering: Admissions into the first year of B.Tech. Programme of Bapatla Engineering College (Autonomous) (Subsequently referred to as B.E.C) will be as per the norms stipulated by the Govt. of Andhra Pradesh from time to time.

2.2 Admission into the Second year of any Four year B.Tech. Programmes of study in Engineering as Lateral Entry Student: Admissions into the second year of B.Tech. Programme of B.E.C will be as per the norms stipulated by the Govt. of Andhra Pradesh from time to time.

2.3 Admissions with advance standing: These may arise in the following cases:

1) When a student seeks transfer from other colleges to B.E.C and intends to pursue B.Tech at B.E.C in an eligible branch of study.
2) When students of B.E.C get transferred from one regulation to another regulation or from previous curriculum to revised curriculum.
3) When a student, after long discontinuity, rejoins the college to complete his/her Programme of study for the award of the degree.

These admissions may be permitted by the Academic Council of B.E.C as per the norms stipulated by the statutory bodies and the Govt. of Andhra Pradesh from time to time. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Programme of study at B.E.C will be governed by the transitory regulations stipulated in ***4.3.3 and 4.3.4.***

3. Details of the Program:

S.No	Activity	Description
1.	Number of Semesters in an Academic Year	Two
2.	Course Work	15 Weeks. 90 instructional days.
3.	Evaluation	As per the Assessment and Examination Policy.

4. Programmes of study in B.Tech:

4.1 The Four year B.Tech Programme is offered in the following branches of study:

S.No.	Title of the UG Programme	Abbreviation
1.	Civil Engineering	CE
2.	Computer Science & Engineering	CS
3.	Electrical & Electronics Engineering	EE
4.	Electronics & Communication Engineering	EC
5.	Electronics & Instrumentation Engineering	EI
6.	Information Technology	IT
7.	Mechanical Engineering	ME

4.2 Structure of the Programme:

As per the Program Review Policy & AICTE model curriculum guidelines.

4.3 Transitory Regulations: For students admitted under advance standing (mentioned in 2.3) these transitory regulations will provide the modus operandi.

At the time of such admission, based on the Programme pursued (case by case)

1) Equivalent courses completed by the student are established by the BOS concerned.
2) Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by the concerned BOS.
3) A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at B.E.C.
4) Marks obtained in the previous system, if the case be, are converted to grades and CGPA is calculated accordingly.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is included into.

4.4 Curriculum for each Programme of study:

1) The Four year curriculum of any B.Tech Programme of study in any branch of engineering is formulated based on the guidelines mentioned in 4.2 and will be recommended by the Board of Studies concerned and is approved by the Academic council of the college.
2) In the case of students admitted through lateral entry, the respective regular curriculum from the second year onwards is to be pursued by such students. Foundation courses may be added if necessary.
3) In the case of students admitted under advanced standing, the equivalency will be prepared by the Department Committee and to be approved by the Board of Studies concerned and the Academic Council.
4) After approval from the Academic Council, Department informs the courses to be taken by all the students along with the academic regulations.

Table below shows a typical curriculum frame work for B.Tech Degree program.

S.No.	Subject Area	Average no. of credits
1.	Humanities & Social Sciences courses	12 - 14
2.	Basic Science Courses	21 – 28
3.	Engineering Science	18 - 21
4.	Professional Core courses	65 – 78
5.	Professional Elective Courses	15 - 21
6.	Open Electives	6 – 12
7.	Major Project / Seminar, etc	12
8.	MOOCs	2
9.	Summer Internship	2
10.	Mandatory courses (2 courses) *	0
	TOTAL	165 - 170

The students admitted through the Lateral Entry scheme have to complete 125 – 130 credits.

*For mandatory courses as suggested by UGC / AICTE no credits are allocated but obtaining pass grade in these subjects is compulsory to obtain degree.

4.5 The Maximum duration permitted to pursue the programme and cancellation of admission:

4.5.1 The maximum duration permitted for any student to successfully complete any four year B.Tech. Programme of study shall be:

1) Eight academic years in sequence from the year of admission for a normal student admitted into the first year of any Programme,
2) Six academic years in sequence from the year of admission for a Lateral entry student admitted into the second year of any Programme, and
3) For students admitted with advanced standing, the maximum time for completion of Programme study shall be twice the period in terms of academic years in sequence, stipulated in the Programme curriculum defined at the time of admission.

4.5.2 In case, any student fails to meet the applicable conditions for the eligibility of degree in the maximum stipulated period as mentioned in ***4.5.1***, his/her admission stands cancelled and no degree will be awarded.

5. EXAMINATION& EVALUATION:

The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades and grade points will be awarded as per section **9.1**.

EVALUATION:

The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades and grade points will be awarded. The performance of a student in each course is assessed with alternate assessment methods, term examinations on a continuous basis during the semester called Continuous Internal Evaluation (CIE) and a Semester End Examination (SEE) conducted at the end of the semester. For each theory, design and/or drawing course, there shall be a comprehensive Semester End Examination (SEE) of three hours duration at the end of each Semester, except where stated otherwise in the detailed Scheme of Instruction.

The distribution of marks between Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) to be conducted at the end of the semester will be as follows:

Nature of the Course	**CIE**	**SEE**
Theory subjects	50	50
Drawing	50	50
Practical	50	50
Term Paper	50	50
Project work	75	75

5.1 Continuous Internal Evaluation (CIE) in Theory and Drawing subjects:

In each Semester there shall be two Term examinations and some **Alternate Assessment Tools (AAT)** like Home Assignment, Class Test, Problem Solving, Group Discussion, Quiz, Seminar and Field Study in every theory course. The Alternate Assessment Tools with detailed modality of evaluation for each course shall be finalized by the teacher concerned before beginning of the course. It will be reviewed and approved by the Department Committee.

The Term Examination is conducted in the regular mode according to a schedule which will be common for a particular year of study. The maximum weightage for Term Examinations, AATs and the calculation of marks for CIE in a theory course is given in the following table.

Particulars	Term Exams (Max. 20 marks)	AAT (Max. 30 marks)
Better Performed ex	75% of marks Obtained	Continuous assessment by teacher as per the predetermined course delivery & assessment plan. (Min. two assessments)
Other exam	25% of marks Obtained	

A minimum of 25 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as passed in that course and eligible to write the SEE of that course.

5.2 Semester End Examination (SEE) in Theory, Design and/or Drawing course:

a) For each theory, design and/or drawing course, there shall be a comprehensive Semester End Examination (SEE) of three hours duration at the end of each Semester for 50 marks, except where stated otherwise in the detailed Scheme of Instruction. Question paper setting shall be set by the teacher or teachers together in a multi section courses and to be verified as described in policy document.
b) A minimum of 20 (40%) marks are to be secured exclusively in the Semester End Examination (SEE) of theory, design and/or drawing course in order to be declared as passed in that course and for the award of the grade in the course.

5.3 Continuous Internal Evaluation (CIE) in laboratory courses:

The evaluation for Laboratory course is based on CIE and SEE. The CIE for 50 marks comprises of 20 marks for day-to-day laboratory work, 15 marks for record submission and 15 marks for a laboratory examination at the end of the semester.

In any semester, a minimum of 90 percent of prescribed number of experiments / exercises specified in the syllabi for laboratory course shall be taken up by the students. They shall complete these experiments / exercises in all respects and get the record certified by the internal lab teacher concerned and the Head of the Department concerned to be eligible to appear for the Final Examination in that laboratory course.

A minimum of 25 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as passed in that lab course and eligible to write the SEE of that lab course.

5.4 Semester End Examination (SEE) in laboratory courses:

a) For each laboratory course, the Semester End Examination (SEE) shall be conducted by one internal and one external examiner appointed by the Principal and the duration of the exam shall be for three hours. The SEE is for 50 marks which include 10 marks for write up, 20 marks for lab experiment/exercise, 15 marks for Viva-voce and 5 marks for general impression.

b) A minimum of 20 (40%) marks shall be obtained in SEE of a laboratory course in order to be declared as passed and for the award of the grade in that laboratory course.

5.5 Evaluation of Term Paper:

a) A term paper is to be submitted by each student in the 7th semester which would be a precursor to the project work to be done in the 8th semester. The evaluation is based on CIE for 50 marks, which includes a minimum of two seminars/presentations for 20 marks and the report submitted at the end of the semester which is evaluated for 30 marks.
b) A minimum of 25 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as passed in the Term Paper and eligible to write the SEE in the Term Paper.
c) The Semester End Examination (SEE) shall be conducted for 50 marks by one internal and one external examiner appointed by the Principal. The SEE contains Viva-voce and the demonstration of the model developed or work performed as a part of the term paper.
d) A minimum of 20 (40%) marks shall be obtained in SEE of the term paper in order to be declared as passed and for the award of the grade in the term paper.

5.6 Evaluation of the Project:

a) In case of the Project work, the evaluation shall be based on CIE and SEE. The CIE for 50 marks consists of a minimum of two Seminars / presentations for 20 marks and the Project Report submitted at the end of the semester which is evaluated for 30 marks.

b) A minimum of 25 (50%) marks are to be secured exclusively in the Continuous Internal Evaluation (CIE) in order to be declared as passed in the Project Work and eligible to write the SEE in the Project Work.

c) SEE shall be evaluated in the form of a Viva- voce and the demonstration of the thesis work for 100 marks. Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the Principal.

d) A minimum of 40 marks shall be obtained in SEE exclusively in order to be declared as passed in the Project and for the award of the grade.

NOTE : A student who is absent for any Test / Exam / Seminar / Presentation as a part of Continuous Internal Evaluation (CIE), for any reason whatsoever, shall be deemed to have scored zero marks in the respective component and no provision for make-up shall be provided.

5.7 Course Repetition (Repeater course)

The students not qualified to write SEE in a course may register for the repeater courses through course repetition and summer semester. The students have to apply to the Principal through the respective HOD by paying prescribed fees.

Course repetition: A student can take up a maximum of two theory courses in a semester immediately after the semester end examinations of that particular semester in accordance with the guidelines recommended by the Academic Council. The students who are not taking regular semester courses may additionally register for one more theory course.

Summer semester: Further the students can register maximum three (theory + lab courses together) courses in the summer semester. Summer semester courses shall be of both even & odd semesters. Summer semester shall be conducted immediately after completion of even semester end examinations.

The HODs concerned have to allot a teacher related to that course to conduct class work. The minimum number of periods to be conducted should not be less than 75% of the total prescribed periods for that course. The classes will be conducted in the vacation period or in the weekends or in the afternoons as decided by the HOD concerned. Teacher has to evaluate the student for his performance in CIE as per the autonomous norms and the qualified students should appear for a semester end examination. The pass criteria in both CIE & SEE should be as per autonomous norms.

The documents for monitoring the candidates registered for course repetition are available with the Heads of the Departments and Exam Section.

6. ATTENDANCE REGULATIONS:

All students shall maintain a minimum attendance of 75% in each course registered. The attendance percentage is computed by considering total number of periods conducted in a course as the denominator and the total number of periods actually attended by the student in that course, as the numerator.

In case of shortfall in this, the Principal of the College shall consider and may condone deficiency up to a limit of 10% in special cases for reasons such as medical emergencies, participation in sport, cultural activities, seminars, workshops and paper presentation etc. at the level of University, State, and National after due recommendation by the concerned Head of the Department.

For the above cases student must take prior permission from the head of the department to participate in such events and in case of medical emergencies intimation should be given immediately and submit the medical certificate to the concerned Head of the Department. Any student failing to meet the above standard of attendance in any course(s) registered, shall not be allowed to appear for SEE of such course(s). The student seeking condonence of attendance on the above grounds has to pay the condonence fee as specified by the college.

Further a student, who could not satisfy the minimum attendance of average 75% in all the courses put together (or 65% in special cases as mentioned above) in any semester, is not eligible to appear for the Semester End examinations and shall have to repeat that semester in the subsequent year.

6.1 Attendance at CIE and SEE: Attendance at all examinations, both CIE and SEE of each course registered shall be compulsory for the students and there shall not be any provision for re-examinations/consideration.

6.2 Any student against whom any disciplinary action by the College is imposed shall not be permitted to attend any SEE in that Semester.

6.3 The basis for the calculation of the attendance shall be the period prescribed by the College by its calendar of events. For the first semester students, the same is reckoned from the date of admission to the course.

6.4 The students shall be informed about their attendance position periodically by the College so that the students can strive to make up the shortage. However, non-receipt of such information from the college will not be considered as valid reason for exemption from the attendance requirements.

6.5 If a student does not fulfil the attendance requirements in any subject, he/she is not permitted to attend the Semester End Examination in that subject and is deemed to have been awarded "F' grade in that subject.

7. **DETENTION:** A student is said to have been detained and not allowed to appear for Semester End Examination (SEE) at the end of the semester when

7.1 The student does not have a minimum average 75% attendance or 65% attendance with condonation in all subjects put together in that semester.

7.2 Such a student shall have to repeat the same semester subsequently and satisfy the above requirements afresh to become eligible to appear for the Semester End Examination (SEE), conducted at the end of the semester.

8. **CONDITIONS FOR PROMOTION:**

8.1 A student not detained in the first semester of a year of study shall be promoted to second semester of that year of study.

8.2 A student shall be eligible for promotion to III semester of B.Tech. Programme, if he/she is not detained in the second semester (of first year B.Tech. Programme) irrespective of the number of backlog courses (in terms of credits not earned) in I year B.Tech. (i.e. I & II semesters together).

8.3 A student shall be eligible for promotion to V semster of B.Tech. Programme, if he/she is not detained in the IV semester and also must secure 50% of the credits of the subjects (including laboratory courses, MOOC courses etc as per curriculum) that have been studied in I & II semesters irrespective of whether the candidate takes the end examination or not as per the normal course of study. At the time of commencement of class work for the V semester, student must secure the required credits.

8.4 A student shall be eligible for promotion to VII semester of B.Tech. Programme, if he/she is not detained in the VI semester of B.Tech. Programme and also must secure 50% of the credits of the subjects (including laboratory courses, MOOC courses etc as per curriculum) that have been studied upto IV semester. At the time of commencement of class work for the VII semester, student must secure the required credits.

And in case of getting detained for shortage of earned credits as per above, the student may make up the credits through supplementary exams for the failed courses before the date of commencement of class work for V or VII semester respectively.

7. **Reregistration of not qualified courses in CIE for lack of attendance or lack of marks:**

Students who failed to secure minimum attendance (75%) and minimum percentage of marks (50%) in CIE specified in any course, he / she will not be allowed to write SEE of that course. Such students have to register and qualify in CIE for those courses through course repletion and summer semester.
Students, who failed after final regular examination (SEE), must appear for the supplementary examinations to be conducted as per the college examination schedule.

8. **Registration:** Every eligible student has to register himself / herself at the beginning of every semester indicating all the Courses taken up for pursuit by him / her during that Semester and mentor's signature is mandatory.

8.1 When a student is debarred for one or more semesters, his / her registration in the present semester is cancelled and the student is debarred from registering in future during the debarred period.

8.2 In any case, while re-registering in any semester, he or she will have to pay the requisite fee once again.

For extended years of study, students must pay the tuition fees as per the college regulations.

9. GRADING SYSTEM

Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each course.

Letter Grades: A letter grade is basically a qualitative measure (an alphabet/letter) giving the performance of a student, such as,

Performance	**Grade**
Extraordinary	A+
Excellent	A
Very Good	B+
Good	B
Average	C
Pass	P
Unsatisfactory/Fail	F

The above grades are based on the marks obtained by the student in both CIE and SEE.

9.1 Grade Points

Depending on the letter grades assigned, a student earns certain grade points. The Colleges follow the 10-point grading system, as given below for absolute grading system.

The letter grades and the corresponding grade points are as given in the Table.

Table: Grades & Grade Points

Grade	Grade Points	% of Marks
A+	10	≥90% – 100%
A	9	≥80% –< 90%
B+	8	≥70% – <80%
B	7	≥60% – <70%
C	6	≥50% –< 60%
P	5	≥45% – <50%
F(Fail)	0	< 45%

9.1.1 The grade points given in above tables help in the evaluation of credit points earned by the student in a Course as the credit points are equal to the number of credits assigned to the Course multiplied by the grade points awarded to the student in that Course. This shall be used in arriving at the Semester Grade Point Average (SGPA) of the student for that semester, as it is the sum of all the credit points earned by the student for all the Courses registered in that semester.

9.1.2 Earning of Credit: A student shall be considered to have completed a Course successfully and earned the credits if he/she secures an acceptable letter grade in the range A+ to P. Letter grade 'F' in any Course implies failure of the student in that Course and no credits earned.

9.2 A student who earns a minimum of 5 grade points (P grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course.

However it should be noted that a pass in any course/term paper/Project shall be governed by the rules mentioned Assessment and Examination Policy.

10. GRADE POINT AVERAGE

10.1 The Grade Point Average (GPA) will be calculated according to the formula:

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the course i,

G_i = grade points obtained by the student in the course.

10.2 Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation.

10.3 To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to that particular point of time.

10.4 Example

Semester	Course Code.	Credits	Grade	Grade Point	Credit Points	SGPA	CGPA
III	18EC301	3	C	6	18	**6.72 (148/22)**	**6.72 (148/22)**
III	18EC302	3	B	7	21		
III	18EC303	3	A	9	27		
III	18EC304	4	P	5	20		
III	18EC305	4	C	6	24		
III	18EC306	2	B+	8	16		
III	18ECL301	1	P	5	5		
III	18ECL302	1	B	7	7		
III	18ECL303	1	A+	10	10		
Total		**22**			**148**		
IV	18EC401	3	P	5	15	**7.40 (163/22)**	**7.06 (311/44)**
IV	18EC402	3	B	7	21		
IV	18EC403	4	A+	10	40		
IV	18EC404	4	C	6	24		
IV	18EC405	2	A	9	18		
IV	18EC406	3	B+	8	24		
IV	18ECL401	1	P	5	5		
IV	18ECL402	1	C	6	6		
IV	18ECL403	1	A+	10	10		
Total		**22**			**163**		

11. ELIGIBILITY FOR AWARD OF B.TECH. DEGREE: A student shall be eligible for award of the B.Tech degree if he/she fulfils all the following conditions:

1) Registered and successfully completed all the components prescribed in the Programme of study to which he/she is admitted
2) Obtained CGPA greater than or equal to 6.0 (Minimum requirements for Pass)
3) Has no dues to the Institute, hostels, Libraries, NCC/NSS etc., and
4) No disciplinary action is pending against him/her

12. AWARD OF CLASS: A candidate who becomes eligible for the award of B.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Table: CGPA required for award of Degree

Distinction	**≥ 8.0***
First Class	**≥ 6.5 < 8.0**
Second Class	**≥ 5.5 < 6.5**
Pass Class	**< 5.5**

* In addition to the required CGPA of 8.0, the student must have necessarily passed all the courses of every semester **in the minimum stipulated period for the Programme**.

If the student did not obtain a CGPA of 6.0 after completing all courses of study, he/she should repeat some courses and obtain higher grade till his/her CGPA is 6.0. Unless he/she obtains a CGPA of 6.0, degree will not be awarded.

12.1 Grade Sheet: A grade sheet (Memorandum) will be issued to each student indicating his performance in all courses taken in that semester and also indicating the Grades and SGPA.

12.2 Transcripts: After successful completion of the total Programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee. Partial transcript will also be issued up to any point of study to any student on request and by paying the stipulated fee in force.

12.3 The Academic council of the College approves and recommends the same to Acharya Nagarjuna University for the award of a degree to any student.

13. IMPROVEMENT OF CLASS:

13.1 A candidate, after becoming eligible for the award of the Degree, may reappear for the Final Examination in any of the theory courses as and when conducted, for the purpose of improving the class. But this reappearance shall be only once and within a period of two academic years after becoming eligible for the award of the Degree.

However, this facility shall not be availed by a candidate who has taken the Original Degree Certificate. Candidates shall not be permitted to reappear either for CIE in any course or for Semester End Examination (SEE) in laboratory courses (including Project Viva-voce) for the purpose of improvement.

14. SUPPLEMENTARY EXAMINATIONS: In addition to the Regular Final Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. Candidates taking the Regular / Supplementary examinations as Supplementary candidates may have to take more than one Final Examination per day.

15. INSTANT SUPPLEMENTARY EXAMINATIONS: Candidates who fail in one theory course of VIII semester can appear for Instant Supplementary Examination conducted after declaration of the revaluation results of the said exam.

16. MALPRACTICES:

The Principal shall refer the cases of malpractices in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) to an Enquiry Committee constituted by him / her. The Committee will submit a report on the malpractice allegedly committed by the student to the Principal. The Principal along with the members of the Committee is authorized to award a punishment as per the norms, if the student is found guilty.

16.1 To prevent the students indulging in Malpractices through latest electronic gadgets such as Cell-phones, Pagers, Organizer PDAs and Palmtops in addition to chits, printed material etc. in the examination halls, students shall be thoroughly checked at the main entrance as well as in the examination halls by the invigilators. The senior staff members appointed as internal flying squad has greater and decisive role to play in this regard.

16.2 A notice displaying the 'SCALE OF PUNISHMENT' shall prominently be displayed at the Main Entrance to the Examination Halls, preferably near the 'Seating Plan Display'.

16.3 If any student is found resorting to malpractice, the matter shall immediately be brought to the notice of Chief/Additional chief superintendent, Flying squad by the invigilator concerned.

16.4 The above staff members will then prepare a detailed report on the spot in proforma-I (copy enclosed) of the case. The full details of the offence and the details of supporting material must be written in establishing the case. The residential addresses of the students involved in malpractice shall be noted with contact telephone numbers in the malpractice report.

16.5 A written statement is to be obtained from the candidate. If any candidate refuses to give the written statement, the same shall be recorded by the invigilator with the signature of another invigilator as witness.

16.6 Whatever be the supporting material for establishing the case of malpractice, the same are to be confiscated immediately for sending the same to the Malpractices prosecuting committee as a proof.

16.7 The supporting materials so confiscated shall be signed by the chief superintendent and flying squad/invigilator and shall be attached and tagged properly to the scripts of the malpractice cases and are to be sent to Malpractices prosecuting committee along with the report (proforma enclosed).

16.8 Any representation to relax the punishment will not be entertained by Malpractices prosecuting committee.

16.9 The answer scripts of the candidates who resorted to mal-practice shall be packed in a separate sealed cover duly subscribing on the cover as "MAL-PRACTICE" and send the same to Malpractices prosecuting committee.

16.10 Any student who is arrogant and does not follow the examination rules shall be sent out of the examination hall after collecting his question paper and answer book. Complaints on such cases shall be lodged to the principal irrespective of imposter is an examinee or an outsider.

SCALE OF PUNISHMENT FOR MAL-PRACTICE CASES

Rule No	Nature of Offence	Scale of Punishment
01	Writing unparliamentary / vulgar / obscene / words or Language in the answer book. OR Refusing to obey instructions of the Chief Superintendent / Invigilator.	The performance of the candidates in that subject shall be cancelled. Further the case should be referred to the disciplinary committee by Chief Superintendent / Malpractices prosecuting committee. If the student repeat the same offence, the performance of the candidate in the semester examination in ALL SUBJECTS (whole/part examination, as the case may be, including Practicals) shall be cancelled
02	A candidate found in possession of any relevant material pertaining to the day of examination such as Papers, Books, Notes OR Notes written on any part of the clothes dressed by the candidate or any part of his/her body or any part of Table or Desk; OR Foot rule, instruments like setsquare, protractor, calculator, mobile phones, etc., with notes written on them. OR Mass copying at the examination centre detected during the conduct of examination or during valuation.	The candidate is to be sent out of the examination hall immediately after obtaining his/her written explanation and duly confiscating his/her Hallticket. He/she shall be allowed to appear for the remaining subjects in that examination by obtaining duplicate hall ticket. The performance of the candidates in that subject shall be cancelled. Further depending on severity of offence or reoccurrence of the offence by the student, the Malpractices prosecuting committee may impose the cancellation of performance of the candidate in two or more or ALL SUBJECTS (whole/part examination, as the case may be, including Practicals) in that semester examination.
03	A candidate found having copied or indulging in copying from any paper, book or notes or any other source or allowed or is found allowing any other candidate to copy any matter from his/her answer book or to have in any manner rendered any assistance to another candidate, or if he/she is found to have been receiving assistance from another candidate. OR Destruction or suppression of the evidence of the forbidden material in any way like swallowing, tearing or throwing outside etc.	The candidate is to be sent out of the examination hall immediately after obtaining his/her written explanation and duly confiscating his/her Hall-ticket. He/she shall be allowed to appear for the remaining subjects in that examination by obtaining duplicate hall ticket. The performance of the candidates in that subject shall be cancelled. Further depending on severity of offence or reoccurrence of the offence by the student, the Malpractices prosecuting committee may impose the cancellation of performance of the candidate in two or more or ALL SUBJECTS (whole/part examination, as the case may be, including Practical's) in that semester examination.
04	Copying detected on the basis of internal evidence such as during valuation/special scrutiny	The performance of the candidates in that subject shall be cancelled. Further depending on severity of offence or reoccurrence of the offence by the student, the Malpractices prosecuting committee may impose the cancellation of performance of the candidate

		in two or more or ALL SUBJECTS (whole/part examination, as the case may be, including Practicals) in that semester examination. Note for MPC: "The Malpractice Prosecuting Committee which awards the punishment to the candidates involved in the malpractice has to make sure of the involvement of the Candidate/s in the offence before any punishment is awarded to the candidate/s."
05	Throwing of Question paper after writing the answers on it to the other candidate(s) with the intention to help the other candidate(s). OR Throwing / Sending the Question paper/ questions contained in the question paper on any sheet/article out during the period of examination with an intention to receive assistance and caught by the Invigilator or by an Officer involved in the conduct of examinations	The candidate is to be sent out of the examination hall immediately after obtaining his/her written explanation and duly confiscating his/her Hall-ticket. He/she shall be allowed to appear for the remaining subjects in that examination by obtaining duplicate hall ticket. The performance of the candidates in that subject shall be cancelled. Further depending on severity of offence or reoccurrence of the offence by the student, the Malpractices prosecuting committee may impose the cancellation of performance of the candidate in two or more or ALL SUBJECTS (whole/part examination, as the case may be, including Practicals) in that semester examination.
06	Exchanging intentionally the answer scripts with a view to give or take help from another examinee.	The candidates (both who helps and who takes help) are to be sent out of the examination hall immediately after obtaining his/her written explanation and duly confiscating his/her Hallticket. The performance of all the candidates involved in the act in all subjects in that particular year/semester examination (whole/ part examination, as the case may be, including Practicals) shall be cancelled.
07	Taking away the answer book or leaving the examination hall without handing over the answer book to the Invigilating Staff whether returned Subsequently or tearing the answer Book.	The performance of the candidate in all subjects in that semester examination (whole/part examination, as the case may be, including Practicals) shall be cancelled and shall not be permitted to appear for whole/part examination, as the case may be, for next subsequent semester examinations.
08	Writing of answers in the answer book by his/her associates in the examination hall or at any other level.	The performance of all the candidates involved in the act in all subjects in that particular year/semester examination (whole/part examination, as the case may be, including Practicals) shall be cancelled and the candidates shall not be permitted to appear for TWO subsequent semesters examinations and they shall not be permitted to study the next higher class (debarred for one semester).
09	Obstructing the Chief Superintendent from performing	The culprits are to be handed over to the Police immediately and a Criminal case is to

	his/her duties, abusing, threatening and showing disrespect towards Invigilator/ Chief Superintendent/ any other official connected with the conduct of examination within the institution premises.	be booked against them. The performance of the candidate in the particular year/ semester examination in ALL SUBJECTS (whole/part examination, as the case may be, including Practicals) shall be cancelled and the candidates shall not be permitted to appear for TWO subsequent semesters examinations and they shall not be permitted to study the next higher class (debarred for one semester).
10	Substitution of answer book. OR Insertion of drawing sheets or replacement of main answer book written outside with one written inside the examination hall.	The performance of the candidate in all subjects in that semester examination (whole/ part examination, as the case may be, including Practicals) shall be cancelled and the candidate shall not be permitted to appear for TWO subsequent examinations and he/she is not permitted to study next higher class (debarred for one semester).
11	Impersonation.	The performance of both the candidates, i.e., the impostor and the candidate, who is being impersonated, in all subjects in that semester examination (whole/ part examination, as the case may be, including Practicals) shall be cancelled and they are not permitted to study and appear for any examination for the next THREE semesters (including academic year in which the impersonation has taken place) in respect of either or both the candidates. A Criminal case may be lodged in the Police Station if the impostor is an outsider
12	Physical assault within the institution premises on personnel connected with the conduct of examinations.	The performance of the candidate in all the subjects in that semester examination (whole/part examination, as the case may be, including Practicals) shall be cancelled and the candidate shall not be permitted to appear for THREE subsequent examinations and he/she is not permitted to study next higher class (debarred for two semester), if any, till he/she completes the punishment period. A Criminal / Disciplinary case is to be booked against the culprits involved in the act.
13	Possession of blank main answer book/ additional answer book/ drawing sheet/ graph sheet which have not been issued in the Examination hall on the day of exam	A Criminal / Disciplinary case is to be booked against the candidate. The matter should be brought to the notice of the authorities for initiation of appropriate action against all the guilty. The performance of the candidate in all subjects in that semester examination (whole/part examination, as the case may be, including Practicals) shall be cancelled.
14	Other offences, if any, not covered under the above provisions.	The Malpractice Prosecuting Committee shall make specific recommendations on the punishment to be awarded keeping in view the gravity of offence and also the scale of punishment, as above.

NOTE:

1 No re-examination shall be conducted, where candidates resort to boycott of examinations on any pretext.
2 In case a candidate resorting to malpractice by copying from any material in his/her possession and/or by any means is caught by the Flying Squad or Observers or any other Officer posted for duty for the examination, the explanation of the Invigilator in that particular hall of examination shall be called for, for not detecting the same and appropriate disciplinary action be initiated against him/her, after examining his/her explanation in the matter.
3 In all the malpractice cases the report made by the Invigilators should be thoroughly enquired into by the Chief Superintendent concerned and he/she should satisfy himself/herself with all the details in the Invigilators report and record the same in his/her report.
4 In cases where there is a laxity on the part of invigilators and chief superintendents and other officials connected with the conduct of examinations in the discharge of their duties properly, such as in cases where mass copying is reported in an examination hall or where the candidate involved in malpractice in an examination hall is booked by flying squad or others but not the invigilator, then appropriate disciplinary action should be taken against all the staff members involved, after giving them notice and considering their explanations, if any, offered.
5 Punishment for different offences committed in all cases and its duration is mentioned above. It is quite possible that in few cases, the punishment recommended to the candidates, may exceed, the validity of the Curriculum in existence. In such cases, the punishment period should be limited to that extent within which the candidate has to obtain his/her B.Tech. In certain cases, the candidate may not get any more chances to appear for examination and qualify for the award of B.Tech. The candidate will have to suffer the consequence for his/her misdemeanor.
6 In all cases of Malpractice, the hall ticket of the candidate is to be confiscated and shall be sent to the Malpractices prosecuting committee along with the answer script in separate cover. The candidate shall not be permitted to appear for the remaining subjects if any, in that examination.

PROFORMA - I

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

MAL-PRACTICE CASE REPORT

1. Examination Hall : _____

2. Date of Examination : _____

3. Time of Examination : _____

4.a) Course : _____

b) Year/Semester : _____

c) Scheme : _____

5. Subject in which candidate is booked:

a) Subject Code : _____

b) Subect : _____

6. Particulars of the candidate booked:

a) Regd. No : _____

b) Name : _____

c) Residential address : _____

: _____

: _____

7.(a) Case booked by : Invigilator / Squad Members / Surprise Check Squad / Other Invigilator / Chief superintendent / Examination officers (Strike out whichever is no applicable)

(b) Name & Designation of the Staff who booked the case : _____

(c) Name & Designation of the Other invigilators in the Hall as witness. : _____

: _____

8. Give Full Details of the Offence : _____

_____

_____

_____

_____

_____

9. Give full details of Supporting material like Written Chits, Printed material, Mobile Phones, Books, Matter written on Scale, Calculator case etc., (matter should be related to the subject of examination on that day). If copied, the copied matter is to be marked in the supporting material and write Regd. No. of the candidate on the supporting material and should be sent to this office along with the answer booklet.

11. Signature of the Invigilator : _____

(whether the case is booked by him or by other officials)

12. Whether the student has given the state or not : YES / NO

13. Signature of the candidate : _____

14. Remarks of the Chief Superintendent : _____

_____

_____

_____

SIGNATURE OF THE CHIEF SUPERINTENDANT

Encl: 1) Answer-script

2) Forbidden confiscated material

3) Statement of Student.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of Bapatla Engineering College (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other matter pertained that meets to the needs of the students, society and industry without any notice and the decision is final.

DISCIPLINE AND CODE OF CONDUCT FOR STUDENTS

The following are some of the important rules of discipline. All students are required to be aware of and act consistently with these values.

1. Students must punctually attend all lectures, practicals, tutorials, assignments, tests, examinations, etc. A student whose attendance and/or progress in the various tests and examinations are not satisfactory and who does not perform the required number of assignments, tutorials and/or practicals are likely to lose their terms. Prolonged absence even on ground of ill health may also lead to loss of terms. Defaulters will not be sent up for Final /University Examinations.
2. The identity card is meant for identifying bonafide students and is used for permitting the students to participate in various activities and programs of the college. Every student must wear Identity card as long as he/she is in the college campus. It must be produced by the student whenever demanded by the member of the teaching or non- teaching staff of the college. Every student must wear his/her Identity card in the college every day. He/She must take proper care of it to avoid its misuse by other students and outsiders. In case the Identity card is lost, the matter should be immediately reported to the Principal and an application should be made for a duplicate Identity card, which will be issued on payment of charges.
3. The conduct of the students in the classes and in the premises of the college shall be such as will cause no disturbance to teachers, fellow students or other classes.
4. Every student shall wear a clean formal dress while coming to the college also when representing the college for various activities out station.
5. No Society or Association shall be formed in the College and no person should be invited in the college campus without the specific permission of the Principal.
6. No student is allowed to display any Notice/Circular/Poster/Banner in the College premises without the prior permission of the Principal.
7. Using foul language in the college campus is prohibited. If any student is caught using foul language, disciplinary action shall be initiated against the student.
8. Use of BEC name tag or logo by the students for their caste, political, religious, personal reasons is prohibited. Further placing banners on caste, political, religious, personal reasons, promoting cinema heroes & political leaders, taking possessions and burning fire crackers in front of the college is strictly prohibited. If any student is involved in such activities in and around the campus, severe disciplinary action will be taken including rusticating from the college and filing a criminal case.
9. Outsiders are not permitted in the college premises without the prior permission of the Principal. College students are not allowed to bring their relatives/friends to the college premises without the permission of the principal.
10. All meetings, cultural programs, debates, elocutions etc. organized on the college premises must be held in presence of teaching staff members and with the prior permission of the Principal. The subjects of debates/elocutions must have the prior approval of the principal.
11. Conducting fresher's meet, farewell meets etc. by the students outside the campus are prohibited. If any student is involved in such activities (organizing as well as participating), severe disciplinary action will be taken including rusticating from the college.
12. Students must take proper care of the college property. Strict action will be taken against students damaging College property and will be required to compensate the damage.
13. Students should not be involved in academic offences including cheating or plagiarism in academic course work malpractices at the College/Board/University Examinations
14. Smoking is strictly prohibited in the college premises.

15. If, for any reason, the continuance of a student in the College is found detrimental to the best interest of the college, the Management may ask the student to leave the college without assigning any reasons and the decision will be final and binding on the student.
16. Playing music on Transistors, Tape-Recorders, Car Stereos, Mobile phones or any other similar gadgets with or without earphones is strictly prohibited in the college premises. Defaulters will be punished and their instrument shall be confiscated.
17. Use of Mobile phones is strictly prohibited in the academic area of the college, Defaulters will be penalized and their instrument confiscated.
18. Students who are travelling to college on personal vehicles (2/4 wheelers) need to have valid driving license issued by RTO and follow all the rules listed by RTO. Students have to park the vehicle in the parking area of the college.
19. Students must not hang around in the college premises while the classes are at work.
20. Students must not attend classes other than their own without the permission of the authority concerned.
21. Students shall do nothing inside or outside the college that will interface with the discipline of the college or tarnish the image of the college.
22. Students are not allowed to communicate any information about college matters to Press.
23. Matters not covered above will be decided at the discretion of the Principal.

Acts of misbehavior, misconduct, indiscipline or violation of the Rules of Discipline mentioned above liable for one more punishments as stated below:

A. Warning to the students.
B. Warning to the student as well as inform the parents.
C. Imposition of a fine.
D. Denial of gymkhana, library, laboratory, N.C.C., N.S.S. student aid or any other facility for a specified period or for the whole Term/Year.
E. Expulsion from College for a specified period
F. Cancellation of Terms.
G. Refusal of admission in the term or academic year.
H. Cancellation of admission.
I. Rustication.

Anti Ragging Rules and Regulations (As per AICTE Norms)

1. **What constitutes Ragging: -** Ragging constitutes one or more of any of the following acts:

a. any conduct by any student or students whether by words spoken or written or by an act which has the effect of teasing, treating or handling with rudeness a fresher or any other student;
b. indulging in rowdy or undisciplined activities by any student or students which causes or is likely to cause annoyance, hardship, physical or psychological harm or to raise fear or apprehension thereof in any fresher or any other student;
c. asking any student to do any act which such student will not in the ordinary course do and which has the effect of causing or generating a sense of shame, or torment or embarrassment so as to adversely affect the physique or psyche of such fresher or any other student;

d. any act by a senior student that prevents, disrupts or disturbs the regular academic activity of any other student or a fresher;
e. exploiting the services of a fresher or any other student for completing the academic tasks assigned to an individual or a group of students.
f. any act of financial extortion or forceful expenditure burden put on a fresher or any other student by students;
g. any act of physical abuse including all variants of it: sexual abuse, homosexual assaults, stripping, forcing obscene and lewd acts, gestures, causing bodily harm or any other danger to health or person;
h. any act or abuse by spoken words, emails, posts, public insults which would also include deriving perverted pleasure, vicarious or sadistic thrill from actively or passively participating in the discomfiture to fresher or any other student;
i. any act that affects the mental health and self-confidence of a fresher or any other student with or without an intent to derive a sadistic pleasure or showing off power, authority or superiority by a student over any fresher or any other student.

2. Actions to be taken against students for indulging and abetting ragging in technical institutions Universities including Deemed to be University imparting technical education:-

1. The punishment to be meted out to the persons indulged in ragging has to be exemplary and justifiably harsh to act as a deterrent against recurrence of such incidents.
2. Every single incident of ragging a First Information Report (FIR) must be filed without exception by the institutional authorities with the local police authorities.
3. The Anti-Ragging Committee of the institution shall take an appropriate decision, with regard to punishment or otherwise, depending on the facts of each incident of ragging and nature and gravity of the incident of ragging.
4. Depending upon the nature and gravity of the offence as established the possible punishments for those found guilty of ragging at the institution level shall be any one or any combination of the following:-
    i. Cancellation of admission
    ii. Suspension from attending classes
    iii. Withholding/withdrawing scholarship/fellowship and other benefits
    iv. Debarring from appearing in any test/examination or other evaluation process
    v. Withholding results
    vi. Debarring from representing the institution in any regional, national or international meet, tournament, youth festival, etc.
    vii. Suspension/expulsion from the hostel
    viii. Rustication from the institution for period ranging from 1 to 4 semesters
    ix. Expulsion from the institution and consequent debarring from admission to any other institution.
    x. Collective punishment: when the persons committing or abetting the crime of ragging are not identified, the institution shall resort to collective punishment as a deterrent to ensure community pressure on the potential raggers.

Important Contact Numbers (In case of Ragging)

Sl.No.	Member Category	Name of the Member	Phone No
1.	Principal	Dr. V. Damodara Naidu, M.Tech., Ph.D.	8332857027
2.	**HODs:**		
	Chemical Engg.	Dr. J.S.Rao, M.Tech., Ph.D.	9490224100
	Civil Engg.	Dr. Ch.Naga Satish Kumar, M.Tech., Ph.D.	9440110124
	CSE	Dr. Shaik Nazeer, M.Tech., Ph.D.,	9642302577
	ECE	Dr. B. Chandramohan, M.Tech., Ph.D.	9491112477
	EEE	Dr. N.Rama Devi, M.Tech.,Ph.D.,	9703374075
	EIE	Prof. Ch.Ramesh M.Tech., (Ph.D.)	9701407595
	IT	Prof. N.Sivarama Prasad, M.Tech.,(Ph.D.)	9885882200
	Mechanical Engg.	Dr. T.Nanacharaiah, M.Tech., Ph.D.	9492715018
	M.C.A.	Sri. K.N.Prasad, M.C.A.,M.Tech.,	8121708069
	Mathematics	Dr. P.VijayaSaradhi, M.Sc.,M.Phil.,Ph.D.	9949559288
	Physics	Dr. K.Rama Krishna, M.Sc., Ph.D.	9441207751
	Chemistry	Dr. V.Madhava Rao, M.Sc., Ph.D.	8374498399
	English	Dr. P.Asha Madhavi, M.A.,M.Phil.,Ph.D.	9951507742
	T& P	Mr. Justin Chako	9845787354
	Warden, Campus Hostel	Dr. T.Chandrasekhara Rao	9848276672
	Coordinator for anti-ragging	Mr. Y. Narendra	9704090941
4.	Police Department	Crime Stopper	1090
		SP, Guntur Rural	9440796200
		SP Camp Office	08632234828
		DSP, Bapatla	9440796165
		CI, Bapatla Town CI, Bapatla Rural	9440796171 9440796221
		PS, Bapatla Town	08643-224036
		SI, Bapatla Rural	9440796258
		Anti-Ragging Toll Free	**18004255314**

BAPATLA ENGINEERING COLLEGE (AUTONOMOUS)

ACADEMIC CALANDER

ACADEMIC CALANDER FOR I & II B.TECH CLASSES

FOR THE ACADEMIC YEAR - 2019-20

I B.TECH. CLASSES

DESCRIPTION	I SEMESTER	II SEMESTER
COMMENCEMENT OF SEMESTER	**05-08-2019**	**02-01-2020**
ORIENTATION PROGRAM	05-08-2019 TO 17-08-2019	---
COMMENCEMENT OF CLASS WORK	19-08-2019	02-01-2020
FIRST MID-TERM EXMINATIONS	15-10-2019 TO 19-10-2019	26-02-2020 TO 02-03-2020
LAST INSTRUCTION DAY	07-12-2019	20-04-2020
SECOND MID-TERM EXAMINATIONS	09-12-2019 TO 13-12-2019	22-04-2020 TO 26-04-2020
PREPARATION HOLIDAYS	14-12-2019 TO 18-12-2019	27-04-2020 TO 01-05-2020
PROPOSED DATE OF SEMESTER END EXAMINATIONS	19-12-2019 TO 31-12-2019	02-05-2020 TO 15-05-2020

II B.TECH. CLASSES: -

DESCRIPTION	I SEMESTER	II SEMESTER
COMMENCEMENT OF CLASS WORK	**24.06.2019**	**02.12.2019**
FIRST TERM EXMINATIONS	04.09.2019 - 11.09.2019	03.02.2020 - 08.02.2020
LAST INSTRUCTION DAY	02.11.2019	28.03.2020
SECOND TERM EXAMINATIONS	04.11.2019 - 09.11.2019	30.03.2020 - 04.04.2020
PREPARATION HOLIDAYS	10.11.2019 - 13.11.2019	05.04.2020 - 08.04.2020
SEMESTER END EXAMINATIONS	**14.11.2019 - 30.11.2019**	**09.04.2020 - 25.04.2020**

Dasara Vacation : 06.10.2019 to 13.10.2019
Pongal Vacation : 12.01.2020 to 19.01.2020

Commencement of class work for the academic year 2020-21 for II & III B.Tech: 15.06.2020

P R I N C I P A L

Library resources, facilities & services

The Central Library of Bapatla Engineering College, one of the biggest Libraries in the state with 22,000 Sq feet has been playing a vital role as information centre catering to the academic and learning needs of the students & faculty. The Library received Best Library Award Four times from Acharya Nagarjuna University.

Library Timings: The Central Library functions from 7AM to 7 PM on all working days.

Resources: As a knowledge bank, the Central Library of BEC has a rich collection of 75,317 books, 523 online International technical journals (Science Direct-275, IEEE-ASPP-183, ASME- 30, ASCE-35) and 120 print journals.

Library Automation: The Library catalogue of books (OPAC) & Circulation of Books (Issue & Return of Books) have been fully computerized with SOUL Library Software & Bar coding system for well maintenance and effective functioning of the Library.

Circulation of Books: All the students are allowed to borrow 2 books per head from the Library on their borrower tickets for a period of one week. Students are required to pay fine for the late return of books as per the Library rules.

Reference book service: A separate reference section is maintained in the Central Library with a stack of 14,970 books including encyclopedias, subject hand books & reference text books.

Issue of reference text books: Students may borrow the reference text books half an hour before closing the Library and return the same by 7.30 AM in the next day.

Book Bank facility: A Book Bank is maintained in the Central Library with 20,634 text books for the benefit of SC, ST & BC category students. All SC & ST category students (scholarship holders) are eligible to borrow 12 books per head from Book Bank for each semester. BC category students are allowed to borrow 2 books per head from Book Bank for each semester.

No Dues Certificate: The student who completed the course of study in the College should get a no dues certificate from the Library by returning all the tickets& books borrowed from the College Library & Book Bank.

Library staff: The Central Library has 08 well experienced staff including the Librarian having more than 10 to 25 years of working experience.

Digital Library: A separate Digital Library is maintained in the Central Library with the infrastructure of 28 computers and 3,237 educational CDs. The Digital Library provides internet facility to the students and faculty.

Students can access the full text of the following e resources in the Digital Library.

- International e journals (Science Direct, IEEE, ASME & ASCE)
- NPTEL Video courses developed by all IITs. (Total 236 Courses - 9,173 Lessons)
- e – books and e – journals of DELNET Digital Library

Xeroxing facility: The Library is providing reprographic facility to students to disseminate material quickly and cost effectively at 50ps. per copy.

COURSE STRUCTURE

HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT

S.NO	SUBJECT	CREDITS
1	Communicative English	**2**
2	Communication Lab	**1**
3	Effective Technical Communication	**2**
4	Soft Skills Lab	**1**
5	Professional Practice, Law & Ethics	**3**
6	Management I (Organizational Behavior)	**3**
		12

BASIC SCIENCE COURSES

S.NO	SUBJECT	CREDITS
1	Physics	**4 +1**
2	Mathematics –I	**3**
3	Mathematics –II	**3**
4	Mathematics –III	**3**
5	Chemistry	**3+1**
6	Biology for Engineers	**2**
7	Environmental studies	**2**
		22

ENGINEERING SCIENCE COURSES

S.NO	SUBJECT	CREDITS
1	Introduction of Civil Engineering	**3**
2	Programming Lab	**2.0**
3	Workshop Manufacturing Practices	**1**
4	Engineering Graphics	**4**
6	Engineering Mechanics	**4**
7	ET & MT	**3**
		17

PROFESSIONAL CORE COURSES/FUNDAMENTAL ENGINEERING PRINCIPLES & TOOLS

S.NO	SUBJECT	CREDITS
1	**20 Subjects +13 Labs**	**75**

OPEN ELECTIVE COURSES

S.NO	SUBJECT	CREDITS
1	Open Elective-I	**3**
2	Open Elective-II	**3**
		6

CORE ELECTIVE COURSES

S.NO	SUBJECT	CREDITS
1	Elective-I	**3**
2	Elective-II	**3**
3	Elective-III	**3**
4	Elective-IV	**3**
5	Elective-V	**3**
6	Elective-VI	**3**
		12

Mandatory Courses

S.NO	SUBJECT	CREDITS
1	Induction program	**0**
2	Indian Constitution, Essence of Indian Traditional Knowledge	**0**
3	Moocs course	**2**
4	Internship	**2**
5	Project	**12**

Course Structure Summary:

S.No.	Category	R18 Credits
1	Humanities & Social Science including Management Courses (HSMC)	12
2	Basic Science Courses (BS)	22
3	Engineering Science courses (ESC)	17
4	Professional Core Courses (PCC)	75
5	Professional Elective Courses (PEC)	18
6	Open Elective Courses (OEC)	6
7	Project work, seminar and internship (PROJ)	14
8	Mandatory Courses (MC)	(non-credit courses)
9	Skill Oriented Courses (SC)	
	Total:-	164+ 2(MOOCS) =166

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective From the Academic Year2018-2019 (R18 Regulations)

First Year B. Tech (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA001	Linear Algebra and ODE	4	0	0	4	50	50	100	3
18PH002	Advanced Optics and Material Testing	4	1	0	5	50	50	100	4
18CE103	Introduction to civil Engineering	4	0	0	4	50	50	100	3
18EL001	Communicative English	3	0	0	3	50	50	100	2
18CE002	Biology for Engineers	3	0	0	3	50	50	100	2
18PHL01	Physics Lab	0	0	3	3	50	50	100	1
18ELL01	Communication Lab	0	0	3	3	50	50	100	1
18CSL01	Computer Programming Lab	2	0	3	5	50	50	100	2
	NCC/NSS/Internship/MOOCs								
	TOTAL	20	1	9	30	400	400	800	18

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective From the Academic Year2018-2019 (R18 Regulations)

First Year B. Tech (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA002	Numerical Methods and Advanced Calculus	4	0	0	4	50	50	100	3
18CY001	Engineering Chemistry	4	0	0	4	50	50	100	3
18CE203	Engineering Mechanics	4	1	0	5	50	50	100	4
18CE001	Environmental Studies	3	0	0	3	50	50	100	2
18CE205	Electrical Technology& Mechanical Technology	4	0	0	4	50	50	100	3
18MEL01	Engineering Graphics	1	0	4	5	50	50	100	4
18CYL01	Chemistry Lab	0	0	3	3	50	50	100	1
18MEL02	Work Shop	0	0	3	3	50	50	100	1
	NCC/NSS/Internship/MOOCs								
	TOTAL	20	1	10	31	400	400	800	21

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B.Tech(SEMESTER – III)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA003	Probability and Statistics	4	0	0	4	50	50	100	3
18CE302	Surveying	4	1	0	5	50	50	100	4
18CE303	Solid Mechanics	3	1	0	4	50	50	100	3
18CE304	Building Materials, Planning and Construction	4	0	0	4	50	50	100	3
18CE305	Fluid Mechanics	3	1	0	4	50	50	100	3
18HU001	Indian Constitution	2	0	0	2	50	50	100	0
18CEL31	Building Drawing Lab	0	0	3	3	50	50	100	1
18CEL32	Engineering Geology Lab	2	0	3	5	50	50	100	2
18CEL33	Surveying Lab	0	0	3	3	50	50	100	1
	TOTAL	22	3	9	34	450	450	900	20

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Second Year B.Tech(SEMESTER – IV)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE401	Professional Practice, Law & Ethics	4	0	0	4	50	50	100	3
18CE402	Environmental Engineering	4	0	0	4	50	50	100	3
18CE403	Mechanics of Materials	3	1	0	4	50	50	100	3
18CE404	Hydraulics & Hydraulic Machines	3	1	0	4	50	50	100	3
18CE405	Concrete Technology	4	0	0	4	50	50	100	3
18EL002	Technical English	3	0	0	3	50	50	100	2
18CEII1	**Internship***	0	0	0	0	-	-	-	2
18CEL41	H & HM Lab	0	0	3	3	50	50	100	1
18CEL42	Environmental Engineering Lab	0	0	3	3	50	50	100	1
18CEL43	Materials Testing Laboratory	0	0	3	3	50	50	100	1
	TOTAL	21	2	9	32	450	450	900	22

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

*** Students will go to the Industry to identify the problem and survey the literature for a feasible solution. The work will be carried out during summer vacation after IV Semester.**

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B.Tech(SEMESTER – V)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE501	Structural Analysis	4	1	0	5	50	50	100	4
18CE502	Remote Sensing &GIS	4	0	0	4	50	50	100	3
18CE503	Design of Concrete Structures	4	1	0	5	50	50	100	4
18CE504	Design of Steel Structures	4	1	0	5	50	50	100	4
18CE505	Water Resources Engineering	4	0	0	4	50	50	100	3
18CE506	Soil Mechanics	4	0	0	4	50	50	100	3
18CEM01	**Self Learning Elective Course)* (MOOCS)**	0	0	0	0	50	50	100	2
18CEL51	Geographical Information System Laboratory	0	0	3	3	50	50	100	1
18CEL52	Soft Skills Laboratory	0	0	3	3	50	50	100	1
	TOTAL	24	3	6	33	450	450	900	25

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

- Students can opt any one of the self-learning courses prescribed by the Department. Students register and complete the opted course in approved MOOCS platform on or before the Last Instruction Day of V semester. They have to submit the certificate before Last Instruction Day ofVI semester

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Third Year B.Tech(SEMESTER – VI)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE601	Estimation & Quantity Surveying	4	0	0	4	50	50	100	3
18CE602	Irrigation Structures	4	0	0	4	50	50	100	3
18CE603	Foundation Engineering	4	0	0	4	50	50	100	3
18CE604	Highway Engineering	4	0	0	4	50	50	100	3
18CED11…14	Elective-I	4	0	0	4	50	50	100	3
18CED21…24	Elective-II	4	0	0	4	50	50	100	3
18CEL61	Advanced Surveying Laboratory	0	0	3	3	50	50	100	1
18CEL62	Structural Analysis Design and Detailing Laboratory	0	0	3	3	50	50	100	1
18CEL63	Geo technical Engineering Laboratory	0	0	3	3	50	50	100	1
	TOTAL	24	0	9	33	450	450	900	21

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

Final Year B.Tech(SEMESTER – VII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE701	Construction Management	4	0	0	4	50	50	100	3
18CED31…34	Elective-III	4	0	0	4	50	50	100	3
18CED41…44	Elective-IV	4	0	0	4	50	50	100	3
18—I--	Institution Elective-I	4	0	0	4	50	50	100	3
18CEP01	Project-I	0	0	5	5				2
18CEL71	Design and Detailing of Irrigation Structures Laboratory	0	0	3	3	50	50	100	1
18CEL72	Transportation Engineering Laboratory	0	0	3	3	50	50	100	1
18CEL73	Quantity Estimation & Project Management Laboratory	0	0	3	3	50	50	100	1
	TOTAL	16	0	14	30	350	350	700	17

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective From the Academic Year2018-2019(R18 Regulations)

Final Year B.Tech(SEMESTER – VIII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE801	Engineering Economics & Management	4	0	0	4	50	50	100	3
18—I--	Institution Elective-II	4	0	0	4	50	50	100	3
18CED51…54	Elective - V	4	0	0	4	50	50	100	3
18CED61…64	Elective – VI	4	0	0	4	50	50	100	3
18CELP02	Project -II	0	0	24	24	75	75	150	10
	TOTAL	16	0	24	40	275	275	550	22

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

Elective-I :

18CED11	Advanced Structural Analysis
18CED12	Instrumentation and Sensor technology in Civil Engineering
18CED13	Sustainable Engineering & Technology
18CED14	Advanced Fluid Mechanics

Elective-II:

18CED21	Advanced Design of Structures
18CED22	Offshore Engineering
18CED23	Disaster preparedness and planning management
18CED24	Construction Engineering Materials

Elective-III:

18CED31	Pre stressed Concrete
18CED32	Environmental Geotechnics
18CED33	Low cost Housing Techniques
18CED34	Repair & Rehabilitation of Structures

Elective-IV

18CED41	Railway and Air Port Engineering
18CED42	Ground Water Development and Management
18CED43	Finite Element Analysis
18CED44	Solid and Hazardous Management

Elective-V :

18CED51	Advanced Environmental Engineering
18CED52	Bridge Engineering
18CED53	Water Resources Field Methods
18CED54	Ground Improvement Techniques

Elective-VI :

18CED61	Earthquake Resistant Design of Structures
18CED62	Environmental Impact Assessment and Management
18CED63	Pavement Analysis and Design
18CED64	Town planning and Architecture

Open Elective-I & II:

The students of CE will choose an Inter department Elective offered by other Departments.

Open Electives offered by Civil Engineering Department

Open Elective-I: 1) Air Pollution & Control 2) Rural Water Supply and Environment Sanitation

Open Elective-II: 1) Disaster Management

2) Remote Sensing & GIS

Institutional Elective-I (in VII semester – position as 6th theory subject)

18CEI01	Air Pollution & Control
18CEI02	Rural Water Supply and Environment Sanitation
18CSI01	Java Programming
18CSI02	Database Management Systems
18ECI01	Consumer Electronics
18ECI02	Embedded Systems
18EEI01	Application of Wavelets to Engineering Problems
18EEI02	Industrial Electrical Systems
18EII01	Principles & Applications of MEMS
18EII02	Power System Instrumentation
18ITI01	Data Analytics
18ITI02	Cyber Security
18MEI01	Fluid Power and Control Systems
18MEI02	Project Management
18MAI01	Linear Algebra
18PHI01	Nano - Materials and Technology
18PHI02	Fiber Optic Communication
18HUI01	System Thinking
18ELI01	English for Competitive Examinations
18ELI02	Professional Communication

Institutional Elective-II (in VIII semester – position as 3rd theory subject)

18CEI03	Disaster Management
18CEI04	Remote sensing & GIS
18CSI03	Python Programming
18CSI04	Computer Networks
18ECI03	Artificial Neural Network
18ECI04	Internet of Things (IoT)
18EEI03	High Voltage Engineering
18EEI04	Energy Auditing and Conservation
18EII03	Robotics and Automation
18EII04	Advanced Computer Control Systems
18ITI03	Mobile Application Developments
18ITI04	Web Technology
18MEI03	Non-Conventional Energy Sources
18MEI04	Automobile Engineering
18MAI02	Graph Theory
18PHI03	Advanced Materials
18PHI04	Optical Electronics
18HUI02	Organizational Psychology
18HUI03	Telugu Modern Literature
18ELI03	English Through Media

BAPATLA ENGINEERING COLLEGE:: BAPATLA

(Autonomous)

LINEAR ALGEBRA AND ODE

I B.Tech –I Semester (Code: 18MA001)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

- Solve a system of linear homogeneous and non-homogeneous equations, finding the inverse of a given square matrix and also its Eigen values and Eigen vectors
- Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and higher order ordinary differential equations.
- Create and analyze mathematical models using first and second order differential equations to solve application problems that arises in engineering.
- Solve a linear differential equation with constant coefficients with the given initial conditions using Laplace Transforms

Course Outcomes: Students will be able to

CO1 Find the eigen values and eigen vectors of a given matrix and its inverse.

CO2 Apply the appropriate analytical technique to find the solution of a first order ordinary differential equation.

CO3 Solve higher order linear differential equations with constant coefficients arise in engineering applications.

CO4 Apply Laplace transforms to solve differential equations arising in engineering.

UNIT - I

Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse; Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values(without proofs); Cayley-Hamilton theorem (without proof).

[Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.]

[12 Hours]

UNIT - II

Differential Equations of first order: Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli's equation; Exact Differential equations; Equations reducible to Exact equations: I.F found by inspection, I.F of a Homogeneous equation, In the equation M dx+ N dy=0.

Applications of a first order Differential equations: Newton's law of cooling; Rate of decay of Radio-active materials.

[Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8] [12 Hours]

UNIT – III

Linear Differential Equations: Definitions; Theorem; Operator D; Rules for finding the complementary function; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation; Method of Variation of Parameters; Applications of Linear Differential Equations: Oscillatory Electrical Circuits.

[Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7;13.8.1;14.1;14.5]

[12 Hours]

UNIT – IV

Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by t^n; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); Application to differential equations: Solution of ODE with constant coefficients using Laplace transforms.

[Sections:21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1]

[12 Hours]

TEXT BOOK:

1. B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.

REFERENCE BOOKS:

1. ErwinKreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.
2. N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	2	-	-	-	-	-	-	-	-	2	2	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	2	2	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	2	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	2	-	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)
ADVANCED OPTICS AND MATERIAL TESTING
I B.Tech – I Semester (Code: 18PH002)
(Common for CE & MECH)

Lectures	4	Tutorial	1		Practical	0	Credits	4	
Continuous Internal Assessment			:	50	Semester End Examination (3Hours)			:	50

Course Objectives:

- To circulate the knowledge about the advanced optics and know its Engineering applications.
- To familiarize the basis of quantum theory and to make students to solve the physical problems.
- To classify solids and to have a basic idea about the structural determination of crystals.
- To make aware of some of the analytical techniques for material testing.

Course Outcomes:

CO1 Understand the principles in the production and application of lasers and their effective Utilization in optical communications.
CO2 Demonstrate appropriate competence and working knowledge of laws of modern physics in understanding advanced technical engineering courses.
CO3 Demonstrate the ability to apply knowledge of band theory of solids and to make understand the concept of energy band gap and hole.
CO4 Understand the crystal geometrics and estimate the crystal structure by X-ray diffraction technique and learn production and applications of ultrasonics and extend it for material testing using various nuclear techniques.

UNIT I

Advanced Optics

Lasers: Interaction of radiation with matter. Einstein co-efficients, Properties of laser, Population inversion, LASER principle, pumping schemes-Three level and four level laser, Types of lasers: solid-state lasers (Ruby), gas lasers (He-Ne), Semiconductor lasers; applications of lasers in industry and medicine.

Fibre Optics: Importance of optical fibre, Structure and principle of optical fibre, acceptance angle and numerical aperture, Types of optical fibres based on modes and refractive index, V-number, losses associated with optical fibres, fibre optical communication, advantages of optical fibres

UNIT II

Quantum Mechanics: Dual nature of light, de-Brogli's concept of matter waves, Davisson-Germer electron diffraction experiment, Heisenberg Uncertainty principle and applications (non-existence of electron in a nucleus and finite width of spectral lines), one dimensional time- independent and dependent Schrödinger wave equations, physical significance of wave

function, applications of time-independent Schrödinger wave equation to particle in a box(one dimensional), tunneling, the scanning tunneling microscope.

UNIT III

Band theory of solids and Structure determination

Band theory of Solids: Failures of classical free electron theory, success and failures of quantum free electron theory, Bloch theorem statement, Kronig-Penny model (without derivation), effective mass of electron, concepts of energy band gap and hole.

Structure determination: Crystal lattices (Bravias), Crystal systems and structures, planes, Miller indices, Bragg's law, structural analysis of crystals using X-Ray powder diffraction method (XRD).

UNIT IV

Ultrasonics and Nuclear Techniques

Ultrasonics: Properties of ultrasonics, General applications of ultrasonics.

Applications of Ultrasonic Testing: Weld inspection, Material analysis, corrosion testing, concrete under water measurements, Ultrasonic testing in the foundry industry.

NDT: Production of Ultrasonic waves, Pulse echo technique, time of flight diffraction technique, A –scan presentation, B- scan presentation, C –scan presentation.

Nuclear Techniques: Nuclear radio isotopes, Applications of radio isotopes (medical and industry) Properties of α,β,ɤ-rays and radiographic testing (NDT).

TEXT BOOKS:

1. A Text Book of Engineering Physics, M.N.Avadhanulu& P. Kshirsagar, S.Chand & Co., (Edition – 2013).
2. Engineering physics by S.O.Pillai

REFERENCE BOOKS:

1. Engineering physics by R.K.Gour and S.L.Gupta. Dhanpatrai publications.
2. Engineering physics by M.R.Sreenivasan. New age international publications.
3. Engineering physics by Palaniswamy. Scitech publications.
4. Basic Engineering physics byDr.P.srinivasaRao, Dr.K.Muralidhar, Himalayapublication
5. Applied physics by Dr.P.srinivasaRao, Dr.K.Muralidhar, Himalaya publication
6. Engineering physics by Dr. D.Thirupathi Naidu, M. Veeranjaneyulu.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	-	1	2	2	1	-	-	-	-	-	-	1	-	-	-
CO2	3	2	2	1	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	2	1	-	1	-	-	-	-	-	-	-	2	-	-	-
CO4	3	3		2	-	-	-	-	-	-	-	-		-	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

INTRODUCTION TO CIVIL ENGINEERING
I B.Tech – I Semester (Code: 18CE103)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3Hours)			:	50

Course Objectives:

- To provide a comprehensive overview of the component fields within civil engineering.
- Expose students to current Civil Engineering projects and their societal implications.
- Introduce students to professionalism through interaction with practicing professionals.
- To give the students an illustration of the use and properties of various building materials andcase studies of the construction materials.
- To provide a sound foundation for the further study of measurement techniques and building surveying case study.

Course Outcomes: Students will be able to

CO1 Understand the importance of civil engineering in the infrastructural development of society.
CO2 Understand the types, and classification of varoius structures.
CO3 Understand the types, uses and properties of various building materials.
CO4 Understand the knowledge of the basic principles of surveying.

UNIT I

History of Civil Engineering, Relevance of Civil Engineering in the overall infrastructural development of the country.Various domains of Civil Engineering and courses of Civil Engineering.Roles and responsibilities of Civil Engineer in the society, Responsibilities of civil engineer in the protection of environment and preservation of natural resources. Opportunities in Civil Engineering and Recent Trends in Civil Engineering

UNIT II

Types and classification of structures – buildings, towers, chimneys, bridges, dams, retaining walls, soil, water tanks, roads, railways, runways and pipelines (Brief description only). Definition and types of buildings as per National Building Code of India (brief description only).

UNIT III

National Building Code (NBC) - Salient features, Site selection for buildings. Civil Engineering Materials- properties - uses– bricks, stones, cement Aggregates: Fine and coarse aggregate –concrete –steel, roofing, flooring, plastering, Doors, Windows, Timber and Paints. Case studies on the materials employed for the aspect of construction.

UNIT IV

Surveying - Object and uses, Fundamental principles, Classification of surveying,Plans and maps, Scales, units of measure, Conventional symbols, measurement ofdistances angels levelling determination of areas. Case studies on surveying aspect.

Text Books:

1. Ramamrutham.S, Basic Civil Engineering, DhanapathiRai Publishing co.
2. Kandya.A.A., Elements of Civil Engineering.Charotar Publishing house.

Reference Books:

1. Rangwala S C and Ketki B Dalal, Building Construction, Charotar Publishing house.
2. McKay, W. B., and McKay, J. K., Building Construction Volumes 1 to 4, Person India Education Services.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	-	-	-	-	1	2	2	-	2	-	2	3	-	-	-
CO2	-	-	-	-	-	-	2	-	-	2	-	2	3	-	-	-
CO3	3	-	-	-	-	-	2	-	-	2	-	2	3	-	-	-
CO4	2	-	-	-	-	1	-	1	2	2	-	2	-	-	-	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

COMMUNICATIVE ENGLISH
I B.Tech – I Semester (Code: 18EL001)

Lectures	3	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment	:	50	Semester End Examination (3Hours)			:	50

Course Objectives:

The course aims to upgrade the spoken and written English of the Civil Engineering students from an intermediate to advanced level, and to help them overcome their fear of public speech.

- It will also focus on introducing the basic research skills and writing skills affiliated to research.
- It also aims to inculcate confidence and to groom their personality so that they can aim at executive level jobs.
- The career focus of this course is to build the combination of language and interpersonal skills needed to work independently, to lead teams effectively, and to become customer focused and result driven in their approach.
- Special emphasis is also laid on developing individual and group effort through virtual and real life trainings, presentations, projects and research, especially towards developing their leadership qualities and the ability, to improve team functioning and team output.

Course Outcomes:

CO1 Understand how to build academic vocabulary to enrich their writing skills.
CO2 Produce accurate grammatical sentences.
CO3 Analyse the content of the text in writing
CO4 Produce coherent and unified paragraphs with adequate support and detail

UNIT-I

1.1 Vocabulary Development: Word formation-Formation of Nouns, Verbs & Adjectives from Root words-Suffixes and Prefixes
1.2 Essential Grammar: Prepositions, Conjunctions, Articles
1.3 Basic Writing Skills: Punctuation in writing
1.4 Writing Practices: Mind Mapping, Paragraph writing (structure-Descriptive, Narrative, Expository & Persuasive)

UNIT-II

2.1 Vocabulary Development: Synonyms and Antonyms
2.2 Essential Grammar: Concord, Modal Verbs, Common Errors
2.3 Basic Writing Skills: Using Phrases and clauses
2.4 Writing Practices: Hint Development, Essay Writing

UNIT- III

3.1 Vocabulary Development: One word Substitutes
3.2 Essential Grammar: Tenses, Voices
3.3 Basic Writing Skills: Sentence structures (Simple, Complex, Compound)
3.4 Writing Practices: Note Making

UNIT- IV

4.1 Vocabulary Development: Words often confused
4.2 Essential Grammar: Reported speech, Common Errors
4.3 Basic Writing Skills: Coherence in Writing: Jumbled Sentences
4.4 Writing Practices: Paraphrasing &Summarizing

REFERENCE BOOKS

1. Communication Skills, Sanjay Kumar &PushpaLatha. Oxford University Press:2011.
2. Practical English Usage, Michael Swan. Oxford University Press:1995.
3. Remedial English Grammar, F.T.Wood. Macmillan:2007.
4. Study Writing, Liz Hamplyons& Ben Heasley. Cambridge University Press:2006

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	-	-	2	-	3	2	2	2	1	-	-
CO2	-	-	-	-	-	-	-	2	-	3	2	2	2	1	-	-
CO3	-	-	-	-	-	-	-	2	-	3	2	2	2	1	-	-
CO4	-	-	-	-	-	-	-	2	-	3	2	2	2	1	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)
BIOLOGY FOR ENGINEERS
I B.Tech – I Semester (Code: 18CE002)

Lectures	3	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment	:	50	Semester End Examination (3Hours)			:	50

Course Objectives: To learn

- To Describe the bio molecules present in living organisms
- To Give awareness about the sterilization methods
- It explains the importance of plants in the ecosystem
- It gives an idea about the classifications of organisms
- It explores the harmful and beneficial role of bacteria

Course Outcomes: Students will be able to

CO1 Explain the Morphology and chemical composition of the cell and function of each organelle present in the cell with the help of microscope.
CO2 Explain the process of human physiological system and its cell functioning.
CO3 Explain the importance of microbiology and immunological science to know the reactions of our body.
CO4 Discuss the biological science related to the different disciplinary areas.
CO5 Explain the importance of genetics and how bioscience is related to other technical areas.

UNIT-I

Introduction to biology; Classification of microorganisms- Two kingdom, Three kingdom & Five kingdom; Prokaryotic cell structure (Bacteria); Eukaryotic cell structure (Plant & Animal cells); Differences between Prokaryotes and Eukaryotes.

UNIT-II

Bacterial Growth Phases; Nutrition in Bacteria; Types of media; Bacteria - Binary Fission, Endospore Formation; Plant & Animal cell Division - Mitosis & Meiosis.

UNIT-III

Structure of DNA (Watson & Crick model); Types of DNA & Function of DNA; Structure of RNA & types of RNA; Differences between DNA &RNA.Types of proteins & structure of proteins.

UNIT-IV

Sterilization methods - Physical methods : Heat, Filtration, radiation; Chemical methods: Phenolics, alcohols, aldehydes, halogens, heavy metals, sterilizing gases, dyes. Economic importance of bacteria (Harmful & Beneficial aspects); Plants in Primary Health care - Tulasi, piper longum, Myrobalan, Aloe vera, Turmeric.

REFERENCES:

1. Prof. K.yadagiri., Dr. M. Manikya Lakshmi, "Botany" paper-I,II,III,IV (Telugu Akademi Coordinating Committee)
2. Presscott, "Microbiology"
3. Pelczar, "Microbiology"
4. Ananthanarayana, "Microbiology"

PHYSICS LAB
I B.Tech – I Semester (Code: 18PHL01)

Lectures	:	0 Practical	3	Continuous Assessment	:	50
Final Exam	:	3 hours Credit	1	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn

- Basic experiments such as Magnetic Field Measurements, Hall Effect and LCR resonance give the knowledge to apply them in magnetic applications.
- The experiments CRO, Solar Cell, LASER diode provides the thorough understanding of OPTO Electronic devices useful in Engineering and Industrial applications.
- The measurements relating to various physical parameters of materials make the student to understand their utility, design and fabrication of several devices.

Course Outcomes: After studying this course, the students will be able to

CO1	Acknowledge the important aspects of earth magnetic field, realize the use of Maxwells equations in various magnetic applications
CO2	Realization of material properties and parameters.
CO3	Get hands on experience in various opto-electronic devices like Solar Cell, Photo Cell and their applications.

LIST OF EXPERIMENTS:

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using Stewart-Gee's apparatus.
3. Determination of thickness of thin wire using air wedge interference bands.
4. Determination of radius of curvature Plano convex lens by forming Newton rings.
5. Determination of wavelengths of mercury spectrum using grating normal incidence method.
6. Determination of dispersive power of a given material of prism using prism minimum deviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
9. Verify the laws of transverse vibration of stretched string using sonometer.
10. Determine the rigidity modulus of the given material of the wire using Torsional pendulum.
11. Draw the load characteristic curves of a solar cell.
12. Determination of Hall coefficient of a semiconductor.

13. Determination of voltage and frequency of an A.C. signal using C.R.O. 14. Determination of Forbidden energy gap of Si &Ge. 15. Determination of wavelength of laser source using Diode laser. Any three experiments are virtual

Text Books :	Engineering physics laboratory manual P.Srinivasarao & K.Muraldhar, HimalayaPublications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	2	2	-	-	-	-	2	-	-	-	2	-	-	3
CO2	3	3	2	2	-	-	-	-	2	2	-	-	2	-	**2**	3
CO3	3	3	2	2	2	-	-	-	2	-	-	-	2	-	-	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)
COMMUNICATION LAB
I B.Tech– I Semester (Code: 18EL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment			50	Semester End Examination (3hours)			50

Course Objectives:

The course aims

- to sensitize the students to the nuances of English speech sounds, word accent, intonation andrhythm
- to bring about a consistent accent and intelligibility in students' pronunciation of English byproviding an opportunity for practice in speaking
- to improve students' fluency in English and neutralize their mother tongue
- to make them use effective vocabulary both in formal and informal situations

Course Outcomes:

By the end of the course the students would be able to

CO1 : Better understand the nuances of English language through audio- visual experience and Group activities
CO2: Develop neutralization of accent for intelligibility
CO3: Build confidence to enhance their speaking skills
CO4: Use effective vocabulary both in formal and informal situations

UNIT-I

1.1 Listening Skills; Importance – Purpose- Process- Types
1.2 Barriers to Listening
1.3 Strategies for Effective Listening

UNIT-II

2.1 Phonetics; Introduction to Consonant, Vowel and Diphthong sounds
2.2 Stress
2.3 Rhythm
2.4 Intonation

UNIT-III

3.1 Formal and Informal Situations
3.2 Expressions used in different situations
3.3 Introducing Yourself & Others-Greeting & Parting-Congratulating-Giving Suggestions &

Advices-Expressing Opinions-Inviting People-Requesting-Seeking Permission-Giving Information- Giving Directions- Sympathizing- Convincing People- Complaining& Apologizing-Thanking Others- Shopping- Travelling- Conversational Gambits

UNIT-IV

4.1 JAM Session
4.2 Debates
4.3 Extempore

REFERENCE BOOKS:

1. Communication Skills, Sanjay Kumar and PushpaLata. Oxford University Press. 2011
2. Better English Pronunciation J.D. O' Connor. Cambridge University Press:1984
3. New Interchange (4rth Edition), Jack C Richards. Cambridge University Press:2015
4. English Conversation Practice, Grant Taylor. McGraw Hill:2001

SOFTWARE:

1. Buzzers for conversations, New Interchange series
2. English in Mind series, Telephoning in English
3. Speech Solutions, A Course in Listening and Speaking

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	-	-	-	3	3	2	2	-	-	2	-
CO2	-	-	-	-	-	-	-	-	3	3	2	2	-	-	2	-
CO3	-	-	-	-	-	-	-	-	3	3	2	2	-	-	2	-
CO4	-	-	-	-	-	-	-	-	3	3	2	2	-	-	2	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

COMPUTER PROGRAMMING LAB
(Civil Engineering)
I B.Tech – I Semester (Code: 18CSL01)

Lectures	2	Tutorial	0	Practical	3	Credits	2
Continuous Internal Assessment	:	50	Semester End Lab Examination (3 Hours)	:	50		

Prerequisites: Basic Mathematics

Course Objectives: To learn

- Geometrical Approach to the mean value theorems and their application to the mathematical problems.
- Concept of Sequence and Series
- Evaluation of improper integrals using Beta and Gamma functions
- Evaluation of multiple integrals and their applications
- Basic properties of vector point function and their applications to line, surface and volume integrals

Course Outcomes: Students will be able to

CO1 Solve problems involving mean value theorems
CO2 Analyze the nature of convergence of sequence and series
CO3 Evaluate integrals using special functions and change of variables
CO4 Evaluate double and triple integrals
CO5 Transform line integral to surface and surface to volume integrals

UNIT – I

Overview of C, Constants, Variables and Data Types, Operators and Expressions, Managing I/O operations.

Programming Exercises for Unit I:C-expressions for algebraic expressions, evaluation of arithmetic and Boolean expressions. Syntactic errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, filling the blanks in a given program. Programs using Scientific and Engineering formulae. Finding the largest of the three given numbers. Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, computation of electricity bill and conversion of lower case character to its upper case.

UNIT II

Decision Making and Branching, Decision Making and Looping

Programming Exercises for Unit II: To print the sum of the digits of a given number and to display the image of a given number. To find whether a given number is prime, printing Fibonacci sequence.

UNIT III

Data Structures: Arrays, Character Arrays and Strings

Programming Exercises for Unit III: Computation of statistical parameters of a given list of numbers. To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not. Transpose of a matrix, product and sum of matrices and sorting of names using arrays. Sorting a list of names using character array.

UNIT IV

User-defined Functions

Programming Exercises for Unit - IV: Functions - Insertion sort, Linear search. Recursive functions to find factorial & GCD (Greatest Common Divisor)

TEXT BOOK:

1. Programming in ANSI C by E. Balaguruswamy, Seventh Edition. TMH

REFERENCE BOOKS:

1. Kernighan BW and Dennis Ritchie M, “C programming language”, 2nded, Prentice Hall.
2. Yashavant P. Kanetkar, “Let us C”, BPB Publications.
3. Herbert Schildt, “C: The Complete Reference”, 4th edition, Tata Mcgraw-Hill.
4. Ashok N.Kamthane, “Programming in C”, PEARSON 2nd Edition

NUMERICAL METHODS AND ADVANCED CALCULUS I B.Tech II Semester 18MA002 (CE)						
Lectures	:	4	Credits - 3	Continuous Assessment	:	50
Final Exam	:	3 hours		Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn how to

➢	Solve algebraic, transcendental and system of linear equations with the help of numerical methods.
➢	Apply the techniques of numerical integration whenever and wherever routine methods are not applicable and solve the first order ordinary differential equations numerically with the given initial condition using different methods.
➢	Evaluate double and triple integrals and apply them to find areas and volumes.
➢	Evaluate the line, surface and volume integrals and learn their inter-relations and applications.

Course Outcomes: After studying this course, the students will be able to

CO1	Solve non-linear equations and system of linear equations with the help of Numerical techniques.
CO2	Solve the first order ordinary differential equations numerically with the given initial condition.
CO3	Find the area and volume of plane and three dimensional figures using multiple integrals.
CO4	Apply vector integral theorems to obtain the solutions of engineering problems involving circulation, flux, and divergence in vector fields.

UNIT-1 (12 Hours)

Numerical Solution of Equations: Introduction; Solution of algebraic and transcendental equations: Bisection method, Method of false position, Newton-Raphson method; Useful deductions from the Newton-Raphson formula; Solution of linear simultaneous equations; Direct methods of solution: Gauss elimination method, Gauss-Jordan method, Factorization method; Iterative methods of solution: Jacobi's iterative method, Gauss-Seidel iterative method.
[Sections:28.1; 28.2; 28.3; 28.5; 28.6; 28.7.1;28.7.2].

UNIT-2 (12 Hours)

Finite differences and Interpolation: Finite differences: Forward differences, Backward differences; Newton's interpolation formulae: Newton's forward interpolation formula, Newton's backward interpolation formula; Interpolation with unequal intervals; Lagrange's interpolation formula; Divided differences; Newton's divided difference formula; Numerical integration; Trapezoidal rule; Simpson's one-third rule; Simpson's three-eighth rule; Numerical solution of ODE's: Introduction; Picard's method; Euler's method; Runge-Kutta method.
[Sections:29.1; 29.1-1; 29.1.2; 29.6; 29.9; 29.10; 29.11; 29.12; 30.4; 30.6; 30.7; 30.8; 32.1; 32.2; 32.4; 32.7]. .

UNIT-3 (12 Hours)

Multiple Integrals: Double integrals; Change of order of integration; Double integrals in polar coordinates; Area enclosed by plane curves; Triple integrals; Volumes of solids: Volume as Triple integral, Change of variables. [Sections: 7.1; 7.2; 7.3; 7.4; 7.5; 7.6.2,7.7.2]. .	
UNIT-4	(12 Hours)
Vector calculus and its Applications: Scalar and vector point functions; Del applied to scalar point functions-Gradient: Definition, Directional derivative; Del applied to vector point functions: Divergence, Curl; Line integral; Surfaces: Surface integral, Flux across a surface; Green's theorem in the plane (without proof); Stokes theorem (without proof); Gauss divergence theorem (without proof). [Sections: 8.4; 8.5; 8.5.1; 8.5.3; 8.6; 8.11.1; 8.12.2; 8.12.3; 8.13; 8.14; 8.16]	
Text Books :	B.S.Grewal, "Higher Engineering Mathematics", 44thedition, Khanna publishers, 2017.
References :	[1] Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons. [2] N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	2	-	-	-	-	-	-	-	-	2	2	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	3	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	2	2	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	2	3	-	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

ENGINEERING CHEMISTRY
(Common to all branches)
I B.Tech – II Semester (Code: 18CY001)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: The student should be conversant

- With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.
- To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.
- With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics.
- With aim to gain good knowledge of organic reactions, plastics, conducting polymers &biodegradable polymers.

Course Outcome: After studying this course, students will be able to

CO1 Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.

CO2 Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.

CO3 Have the capacity of applying energy sources efficiently and economically for various needs.

CO4 With aim to gain good knowledge of organic reactions, plastics, conducting polymers &biodegradable polymers.

UNIT I

Water Chemistry
Introduction: water quality parameters
Characteristics: Alkalinity, Hardness - Estimation & simple numerical problems,
Boiler Troubles - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming;
Internal conditioning- Phosphate, calgon and carbonate methods.
External conditioning - Ion exchange process & Zeolite process
WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration. Disinfection methods: Chlorination, Ozonization and UV treatment.
Salinity – Treatment of Brackish water by Reverse Osmosis and Electro dialysis.

UNIT II

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cell potentials, the Nernst equation and applications.

Corrosion: Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion; Galvanic, stress, pitting and differential aeration corrosion; Factors effecting corrosion,
Corrosion control – Cathodic protection, and electro plating (Au)& electoless Ni plating.

UNIT III

Classification of fuels; Calorific value of fuels (lower, higher)
Solid fuels: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking,
Liquid Fuels: Petroleum refining and fractions, composition and uses. Knocking and anti-knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages
Gaseous fuels: CNG and LPG,
Flue gas analysis – Orsat apparatus.

UNIT IV

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution (SN^1, SN^2), addition (Markownikoff's and anti-Markwnikoff's rules) , elimination (E_1& E_2), Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol)
Polymers: Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications**.** Plastics: Thermoplasts and thermosetting plastics, Bskelite and PVC.
Bio degradable polymers: types, examples-Polyhydroxybuterate (PHB), Polyhydroxybuterate-co-β-hydroxyvalerate (PHBV), applications.

TEXT BOOKS:

1. P.C. Jain and Monica Jain, "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi 17th edition (2017).
2. SeshiChawla, "Engineering Chemistry"DhanpatRai Pub, Co LTD, New Delhi 13 th edition, 2013.

REFERENCES:

1 Essential Of Physical Chemistry by ArunBahl, B.S. Bahl, G.D.Tuli, by ArunBahl, B.S. Bahl, G.D.Tuli, Published by S Chand Publishers, 12th Edition, 2012.

2 Text Book of Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).

3 Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	3	2	3	-	2	3	-	-	-	-	3	3	-	-	-
CO2	2	3	2	3	-	2	3	-	-	-	-	3	2	-	-	-
CO3	2	3	2	3	-	2	3	-	-	-	-	3	2	-	-	-
CO4	2	3	3	3	-	2	3	-	-	-	-	3	-	-	-	-

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ENGINEERING MECHANICS
(CIVIL ENGINEERING)
I B.Tech – II Semester (Code: 18CE203)

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: PHYSICS

Course Objectives: To learn

- The concepts Force systems, free body diagrams, resultant of forces and equations of equilibrium, Supports and support reactionsandcalculation of Centroid
- The Concept of moment of inertia of plane figures, Laws and applications of friction
- The Analysis of the truss and determination of axial forces by Method of Joints
- Motion of a body and their relationships and application of D Alembert's principle in rectilinear and curvilinear motions
- AboutMass moment of inertia of material bodies, Plane motion of a body about a fixed axis

Course Outcomes: Students will be able to

CO1 Analyze the forces developed at the contact of the bodies by constructing the freebody diagram and location of centroid.

CO2 Analyze the systems with friction, and M.I of composite figures .

CO3 Analyze the axial forces in the members of truss and understanding of the principles of dynamics.

CO4 Analyze of moment of inertia of material bodies and Rotation of rigid body about fixed axis.

UNIT – I

Concurrent Forces in a Plane

Principles of statics – composition and resolution of forces – equilibrium of concurrent forces in a plane –Method of moments.

Parallel Forces in a Plane

Two parallel forces – general case of parallel forces in a plane – center of parallel forces – Centroids of composite plane figures and curves.

UNIT – II

Moments of Inertia of Plane Figures

Moment of inertia of a plane figure with respect to an axis in its plane – Moment of Inertia with respect to an axis perpendicular to the plane of the figure – Parallel axis theorem.

Friction

Characteristics of friction – problems involving dry friction, ladder friction and wedge friction.

UNIT – III

Analysis of Plane Trusses

Trusses types – Axial forces finding in the members using method of joints.

Kinematics and Kinetics of a particle

Kinematics of rectilinear motion – principles of dynamics – Differential equations of rectilinear motion, D'Alemberts principle -Kinematics of curvilinear motion – Differential equations of curvilinear motion – D'Alembert's principle.

UNIT – IV

Moments of Inertia of Material Bodies

Moment of inertia of a rigid body – Moment of inertia of a lamina – Moments of inertia of three – dimensional bodies.

Rotation of a Rigid Body about a Fixed Axis

Kinematics of rotation – Equation of motion for a rigid body rotating about a fixed axis – D'Alembert's principle.

TEXT BOOK

1. Engineering mechanics by S. Timoshenko and D. H. Young – McGraw-Hill International edition (For concepts and symbolic problems)
2. Engineering mechanics statics and dynamics by R. C. Hibbeler and Ashok Gupta – Pearson (For numerical problems using S.I. system of units)

REFERENCE BOOKS

1. Vector mechanics for engineers statics and dynamics by Beer and Johnston, Tata McGraw-Hill publishing company, New Delhi
2. Engineering mechanics statics and dynamics by A. K. Tayal – Umesh publication, Delhi (For numerical problems using S.I. system of units

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	-	-	-	-	-	1	1	-	-	-	3	-	1	2
CO2	3	2	-	-	-	-	-	1	1	-	-	-	3	-	1	2
CO3	3	2	-	-	-	-	-	1	1	-	-	-	3	-	1	2
CO4	3	2	-	-	-	-	-	1	1	-	-	-	3	-	1	2

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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ENVIRONMENTAL STUDIES
I B.Tech – II Semester (Code: 18CE001)

Lectures	3	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: To learn

- To develop an awareness,knowledge, and appreciation for the naturalenvironment.
- To understand different types of ecosystems exist in nature.
- To know our biodiversity.
- To understand different types of pollutants present in Environment.
- To know the global environmental problems.

Course Outcomes: Students will be able to

CO1 Develop an appreciation for the local and natural history of the area.

CO2 Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of people's movements focusing on environment.

CO3 Know how to manage the harmful pollutants.

CO4 Gain the knowledge of Environment.

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness. Ecosystems: Definition, Structure and Functions of Ecosystems, types - Forest, Grassland, Desert, Aquatic (Marine, pond and estuaries).

Biodiversity: Definition and levels of Biodiversity; Values of Biodiversity - Consumptive, Productive, Social, Aesthetic, Ethical and Optional; Threats and Conservation of Biodiversity; Hot Spots of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation. Chipko movement case study

UNIT – II

Natural resources: Land: Land as a resource, Causes and effects of land degradation - Soil erosion, Desertification. **Forest**: Use of forests, Causes and effects of deforestation, Afforestation, Mining - benefits and problems. **Water**: Uses, floods and drought, Dams - benefits and problems.

Energy: Importance of energy, Environmental Impacts of Renewable and Non-renewable energy resources. Silent Valley Project and Narmada BachaoAndolan case studies

Sustainability: Definition, Concept and Equitable use of resources for sustainable development; Rain water harvesting and Watershed management. Fieldwork on Rain water harvesting and Watershed management.

UNIT – III

Pollution: Definition; Causes, effects and control of air, water and nuclear pollution; Chernobyl Nuclear Disaster case study; Solid Waste: urban, Industrial and hazardous wastes; Integrated waste management - 3R approach, composting and vermin composting.

Environmental acts: Water and air (Prevention and Control of pollution) acts, Environmental protection act, Forest Conservation act.

UNIT – IV

Environmental issues: Green house effect & Global warming, Ozone layer depletion, Acid rains, Green Revolution, Population Growth and environmental quality, Environmental Impact Assessment.Environmental Standards (ISO 14000, etc.)
Case Studies: Bhopal Tragedy, Mathura Refinery and TajMahal, and Ralegan Siddhi (Anna Hazare).

Field work: Visit to a local area to document environmental assets – Pond/Forest/Grassland. Visit to a local polluted site- Urban and industry/ Rural and Agriculture.

TEXT BOOKS:

1. "Environmental Studies" by Benny Joseph, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. "Comprehensive environmental studies"- JP Sharma, Laxmi Publications.
3. Text Book of environmental Studies – ErachBharucha

REFERENCE BOOKS:

1. "Environmental studies", R.Rajagopalan, Oxford University Press.
2. "Introduction to Environmental Science", Anjaneyulu Y, B S Publications
3. "Environmental Science", 11th Edition – Thomson Series – By Jr. G. Tyler Miller.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	2	1	1	-	2	1	-	1	-	2	-	-
CO2	-	-	-	-	-	-	2	-	-	1	2	1	-	1	-	-
CO3	-	-	-	1	-	1	1	-	2	1	-	3	-	1	-	-
CO4	-	-	-	-	-	2	2	1	1	2	-	2	-	1	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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ELECTRICAL TECHNOLOGY & MECHANICALTECHNOLOGY
I B.Tech – II Semester (Code: 18CE205)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

- To introduce concepts of DC and AC circuits and electromagnetism.
- To make the students understand the concepts and working of single-phase transformers, DC motor and generators.
- To understand fundamentals of mechanical engineering related to civil engineering
- To make the students understand the concepts and working of Thermal Prime Movers and Compressors

Course Outcomes: After the completion of the course the students will be able to

CO1 To understand the basic terms in Electrical Technology.
CO2 To know the working principles of AC & DC Generators and motors.
CO3 To understand the basic terms in mechanical technology.
CO4 To understand the principle of manufacturing process.

Part- A: ELECTRICAL TECHNOLOGY

UNIT – I

Electrical circuit elements (R, L and C), Definitions of voltage and current, Power & Energy, Kirchhoff current and voltage laws, Direct Current; Alternating Current; Comparison between Half wave & Full wave Rectifiers, Advantages of Alternating Current. Have wave and Full wave Rectifiers.

Electrical Machines: Constructional details, Working Principle & Applications of DC Generators & Motors. Constructional details, working & Applications of Transformers.

UNIT – II

Electrical Machines (Contd.): Constructional details, Working Principle & Applications of Alternators, Three phase and single phase Induction Motors.

Transmission Lines: Necessity of Transmission Lines, Types of Towers; sad and stress in overhead conductors at level supports; sag span curves, effect of wing on sag.

Part- B: MECHANICAL TECHNOLOGY

UNIT – I

Transmission of Power: Belt drives: Velocity ratio, Slip, Ratio of tensions, Power transmitted, Creep.

Principles of Manufacturing Processes: Casting, Rolling, Drawing, Turning, Drilling, Milling, Welding & Soldering.

UNIT – II

Thermal Prime movers: Principle and operation of I.C Engines, Working of 2-S, 4-S, S.I and C.I engines, comparison of S.I & C.I, 2-S & 4-S engines, Brief introduction to civil construction equipment.

Compressors: Operation and application of single stage and multistage reciprocating air compressors.

TEXT BOOK: Engineering Basics by T.Thyagarajan, K.P. SendurChelvi and T.R. Rangaswamy, New Age International Ltd.

TEXT BOOK : Elements of Mechanical Engineering by Mathur, Mehta&Tewari, Jain Brothers, New Delhi.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	1	-	-	2	-	-	-	3	1	2	1	2	1	1	2
CO2	2	1	-	-	2	-	-	-	3	1	2	1	2	1	1	2
CO3	2	1	-	-	2	-	-	-	1	1	2	1	2	1	1	2
CO4	2	1	-	-	2	-	-	-	3	1	2	1	2	1	1	2

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ENGINEERING GRAPHICS
I B.Tech – II Semester (Code: 18MEL01)

Lectures	1	Tutorial	0	Practical	4	Credits	4
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: To learn

- Clear picture about the importance of engineering graphics in the field of engineering
- The drawing skills and impart students to follow Bureau of Indian Standards
- To give an idea about Geometric constructions, Engineering curves, orthographic projections and pictorial projections
- Imagination skills about orientation of points, lines, surfaces and solids
- Basic drafting skills of AutoCAD

Course Outcomes: Students will be able to

CO1 Students will be able to enhance their visualization skills and drawing communication skills.

CO2 Students will be able to have knowledge on general geometrical constructions and skills on plotting projections of lines , planes and solids.

CO3 Students will be able to generate the pictorial views into orthographic views of simple castings.

CO4 Students will be able to convert the orthographic views into isometric views of simple objects.

UNIT – I

Introduction: Introduction to Drawing instruments and their uses, geometrical construction procedures

Introduction To Autocad:

Basics of sheet selection, Draw tools, Modify tools, dimensioning

Method Of Projections: Principles of projection - First angle and third angle projectionof points. Projection of straight lines.Traces of lines.

UNIT II

Projections Of Planes: Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

UNIT – III

Projections Of Solids: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones Inclined to one plane. .

UNIT –IV

Isometric Projections: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only).

UNIT –V

Orthographic Projections: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

TEXT BOOK:

1. Engineering Drawing with AutoCAD by Dhananjay M. Kulkarni (PHI publication)
2. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand). (First angle projection)

REFERENCE BOOKS:

1. Engineering Drawing by Dhananjay A Jolhe, Tata McGraw hill publishers
2. Engineering Drawing by Prof.K.L.Narayana& Prof. R.K.Kannaiah.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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CHEMISTRY LABORATORY
(Common to all branches)
I B.Tech – II Semester (Code: 18CYL01)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student should know:
➢ The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.
➢ To determine the percentage purity of washing soda bleaching powder and given salt. The measurement of quality parameters of water to check its suitability for domestic and industrial purpose
➢ To estimate the characteristic properties of oil for its use at various level
➢ To synthesize the Soap, Resin and Aromatic Ester followed by their applications. The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications

Course Outcomes: After the completion of the course students will be able to	
CO1	Familiar with fundamental basics of Chemistry lab
CO2	Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.
CO3	Gain the knowledge regarding the quality parameters of water & oil like Salinity, hardness, alkalinity saponification and iodine value.etc.
CO4	Prepare high polymers and soap & Instrumentation techniques

LIST OF EXPERIMENTS

1. **Introduction to Chemistry Lab** (the teachers are expected to teach fundamentals likeCalibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. anderror, accuracy, precision, theory of indicators, use of volumetric titrations).

2. **Volumetric Analysis:**
   a. Estimation of Washing Soda.

b. Estimation of Active Chlorine Content in Bleaching Powder
c. Estimation of Mohr's salt by permanganometry.
d. Estimation of given salt by using Ion-exchange resin using Dowex-50.

3. **Analysis of Water:**
   a. Determination of Alkalinity of Tap water.
   b. Determination of Total Hardness of ground water sample by EDTA method
   c. Determination of Salinity of water sample
4. **Estimation of properties of oil**:
   a. Estimation of Acid Value
   b. Estimation of Saponification value
5. **Preparations:**
   a. Preparation of Soap
   b. Preparation of Urea-formaldehyde resin
   c. Preparation of Phenyl benzoate
6. **Demonstration Experiments (Any two of the following):**
   a. Determination of $p^H$of given sample.
   b. Determination of conductivity of given sample by conductometer.
   c. Potentiometric Determination of Iron.

TEXT BOOKS (for Chemistry 1 and 2):

1. Practical Engineering Chemistry by K.Mukkanti, Etal, B.S. Publicaitons, Hyderabad, 2009.
2. Inorganic quantitative analysis, Vogel, 5^{th} edition, Longman group Ltd. London, 1979.

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R.n. Goyal and HarrmendraGoel.
2. A text book on experiments and calculations- Engineering Chemistry. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	2	2	2	2	-	2	-	-	-	-	-	2	-	-	-	-
CO3	2	2	2	2	-	2	-	-	-	-	-	2	2	-	-	-
CO4	2	2	2	2	-	-	-		-	-		2	-	-	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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WORKSHOP
I B.Tech – II Semester (Code: 18MEL02)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

- To impart student knowledge on various hand tools for usage in engineering applications.
- Be able to use analytical skills for the production of components.
- Design and model different prototypes using carpentry, sheet metal and welding.
- Make electrical connections for daily applications.
- To make student aware of safety rules in working environments.

Course Outcomes: After completion of this course student should be able to:

CO1 Make half lap joint, Dovetail joint and Mortise &Tenon joint
CO2 Produce Lap joint, Tee joint and Butt joint using Gas welding
CO3 Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools
CO4 Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring.

Syllabus:

1. Carpentry
   a. Half Lap joint
   b. Dovetail joint
   c. Mortise &Tenon joint
2. Welding using electric arc welding process/gas welding
   a. Lap joint
   b. Tee joint
   c. Butt joint
3. Sheet metal operations with hand tools
   a. Trapezoidal tray
   b. Funnel
   c. T-joint
4. House wiring
   a. To control one lamp by a single switch
   b. To control two lamps by a single switch
   c. Stair-case wiring

TEXT BOOKS:

1. P.Kannaiah and K.L.Narayana, Workshop Manual, SciTech Publishers, 2009.
2. K. Venkata Reddy, Workshop Practice Manual, BS Publications, 2008.

PROBABILITY AND STATISTICS II B.Tech III Semester 18MA003 (CE)						
Lectures	:	4	Credits - 3	Continuous Assessment	:	50
Final Exam	:	3 hours		Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn how to

➢	Apply the continuous probability densities to various problems in science and engineering.
➢	Estimate the point and interval estimators of the mean, variance and proportion for the given Sample data and apply Z-test, t-test to various real-life problems.
➢	Apply various sample tests like F-test and $\chi 2$ -test for decision making regarding the population based on sample data.
➢	Compute the level of correlation, the best fit curve to the given data by the method of least squares and also perform ANOVA arising in the field of engineering.

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

CO-1	Understand various continuous probability density functions and apply them to various problems in science and engineering.
CO-2	Estimate the point and interval estimators of the mean, variance and proportion for the given Sample data and apply Z-test and t-test to various real life problems.
CO-3	Apply various sample tests like F-test and $\chi 2$ -test for decision making regarding the population based on sample data and perform one way and two way analysis of variance to different realistic problems.
CO-4	Compute the level of correlation, the linear relationship for the given bivariate data, the best fit curve to the given data by the method of least squares and perform multiple regression analysis to the regression model arising in the field of engineering.

UNIT-1 (12 Hours)

Continuous Random Variables, Normal Distribution, Normal Approximation to the Binomial Distribution, Uniform Distribution, Gamma Distribution and its applications, Beta Distribution and its applications, Joint Distributions (Discrete),Joint Distributions (Continuous).Populations and Samples, Law of large numbers, Central limit theorem and its applications,The sampling distribution of the mean (σ unknown),The sampling distribution of the variance.
(Sections 5.1, 5.2, 5.3, 5.5,5.7, 5.8, 5.10, 6.1, 6.2, 6.3, 6.4 of Text Book [1])

UNIT-2 (12 Hours)

Point estimation, Interval estimation, Tests of Hypotheses, Null Hypothesis and Tests of hypotheses, Hypothesis concerning one mean, Comparisons-Two independent Large samples, Comparisons-Two independent small samples, Paired sample t test.
(Sections 7.1,7.2, 7.4, 7.5, 7.6, 8.2, 8.3, 8.4 of Text Book [1])

UNIT-3	(12 Hours)
The estimation of variances, Hypotheses concerning one variance, Hypotheses concerning two variances, Estimation of proportions, Hypotheses concerning one proportion, Hypotheses concerning several proportions, Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- one way classification(Completely randomized designs), Procedure for Analysis of Variance (ANOVA) for comparing the means of k (>2) groups- two way classification(Randomized block designs). (Sections 9.1, 9.2, 9.3, 10.1, 10.2, 10.3, 12.2, 12.3 of Text Book [1]).	
UNIT-4	(12 Hours)
Multivariate Analysis: The concept of bivariate relationship, scatter diagram, Pearson's correlation and correlation matrix. Simple linear regression model and assumptions, Least Squares Estimation of the parameters of the model, Testing the significance of the model. Regression versus Correlation, Multiple linear regression model with k explanatory variables and assumptions of the model. Least Square Estimation of regression coefficients. Concept of the coefficient of determination R^2. Test for significance of the regression model and individual regression coefficients. Applications of multiple regression analysis. (1st and 2nd Chapters of Text Book [2]).	
Textbooks	1. Miller & Freund's "Probability and Statistics for Engineers", Richard A. Johnson, 8th Edition, PHI. 2. Introduction to Linear Regression Analysis, Douglas C. Montgomery, E.A. Peck and G.G. Vining, 3rd edition, Wiley.
Reference Books	1. R.E Walpole, R.H. Myers & S.L. Myers 'Probability & Statistics for Engineers and Scientists', 6th Edition, PHI. 2. Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor,11th Edition, Sultan Chand & Sons. 3. Murray R Spiegel, John J.Schiller, R. AluSrinivasa, 'Probability &Satistics', Schaum's outline series. 4. K.V.S.Sarma,'Statistics Made Simple – Do it yourself on PC',Prentice Hall India, Second Edition, 2015.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	-	-	-	-	-	-	-	-	-	2	3	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	2	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	2	2	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	2	-	-	-

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SURVEYING
II B.Tech – I Semester (Code: 18CE302)

Lectures	4	Tutorial	1		Practical	0	Credits	4
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To study the basics of linear/angular measurement methods like chain surveying, compass surveying.
- To study the basics of leveling and theodolite survey in elevation and angular measurements.
- To determine the relative positions of the existing features on the ground.
- To deal with various methods employed for the measurement of areas and volumes.
- To study different methods of setting & design of simple circular curves.
- To introduce about EDM, Digital theodolite and total station.

Course Outcomes: At the end of course student will able to:

CO1 Understand terminology, ranging methods, chain and tape corrections, errors in surveying, types of compasses, local attraction.

CO2 Undertstand knowledge to proficiently conduct theodolite traverse and execute levelling tasks.

CO3 Calculating the area of tracts with both straight and irregular boundaries using various formulae, determining the volume of level and two-level sections, and knowedge of triangulatin.

CO4 Understand setting out various types of curves, as well as the field procedures for conducting surveys using total stations.

UNIT –I

Chain survey-Terminology-Ranging-methods, Chain & tape corrections-problems, obstacles in chaining Errors in surveying- Types & sources of errors. Compass survey-Bearings-Types of compass-F.B-B.B-Local attraction-Problems on local attraction, Declination.

UNIT –II

Theodolite traverse- Types of traverse- Checks in closed & open traverse- Latitude and Departures-Error of closure-Problems on omitted measurements.

Levelling-Classification of levelling-Terminology-Types of levels-booking and reducing levels &Probelems.

Contouring: Methods-Characteristics, uses;

UNIT –III

Areas & Volumes- Area of tract with straight & irregular boundaries by various formulae- Volume of level & two level sections- Problems.
Triangulation –classification- Baseline – site selection for base line- Classification of Signals.Satellite station - reduction to Centre.

UNIT –IV

Setting out curves: Types, elements of simple circular, Compound & Reverse curves.
Principle of Electronic Distance Measurement, Types of EDM instruments, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey,

TEXT BOOKS:

1. Arora, K.R. I, Surveying, Vol-I, II and II, Standard Book House, 2015.
2. Surveying Vol. I&II by B.C. Punmia ,Laxmi Publications,2005

REFERENCES:

1. Chandra A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
2. C. Venkatramaiah, Text Book of Surveying, Universities Press Pvt Ltd, Hyderabad. Revised Edition 2011.
3. Madhu N., Sathikumar, R. and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	-	-	-	2	-	-	-	-	-	-	3	2	-	-
CO2	3	3	-	-	-	2	-	-	-	-	-	-	3	2	-	-
CO3	3	3	-	-	-	2	-	-	-	-	-	-	3	2	-	-
CO4	3	3	-	-	-	2	-	-	-	-	-	-	3	2	-	-

BAPATLA ENGINEERING COLLEGE: BAPATLA
(Autonomous)

SOLID MECHANICS
II B.Tech – I Semester (Code:18CE303)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course objectives: The objective of this Course is

- To explain fundamental concepts such as stress, strain, elastic constants, compatibility, thermal stresses etc.
- To understand the stresses and strains in thin cylinders and spherical shells.
- To draw the shear force and bending moment diagrams for beams.
- To understand simple bending theory, flexural stresses and shear stresses.
- To understand torsion and stresses developed by torsion on circular shafts and application of strain energy principles on springs.

Course Outcomes: On completion of the course the student will be able to

CO1 Understand the concepts of plain stress and strain in axially loaded elastic members and its applications to thin walled pressure vessels.
CO2 Analyze the internal forces in the beams for different types of loads.
CO3 Applying the stress concept to beams subjected to flexure and shear.
CO4 Analyze the shafts and closely coiled helical springs under Torsion.

UNIT-I

1. Simple Stress And Strain

Elasticity and plasticity - Types of stresses & strains - Hooke's law - stress - strain diagram for mild steel –Allowable stress-Factory of safety - Normal strain, Poisson's ratio & volumetric strain - Elastic moduli & the relationship between them - Bars of varying section – composite bars - Temperature stresses

2. Thin Walled Pressure Vessels

Thin cylinders - circumferential and longitudinal stresses and strains - Spherical pressure vessels.

UNIT-II

3. Internal Forces In Beams

Introduction – Diagrammatic conventions for supports and loads – Calculation of beam reactions – Application of method of sections – Shear force in beams – Bending moment in beams – Shear force and bending moment diagrams

UNIT-III

4. Bending Stresses in Beams
Introduction – Basic assumptions – the elastic flexure formula – application of flexure formula

5. Shear Stresses in Beams
Introduction – Shear flow –The shear stress formula for beams – Shear stress in beam flanges- Shear center

UNIT-IV

6. Torsion
Introduction - Application of the method of sections - Torsion of circular elastic bars - Basic assumptions - the torsion formula - Design of circular bars in torsion for strength - Angle of twist of circular bars –strain energy due to torsion

7. Strain Energy
Introduction-Elastic strain energy for uni-axial stress- Strain energy of beams in shear-Strain energy for multi-axial state of stress.

8. Springs
Types of springs - stresses in closely coiled helical springs-Deflection of closely coiled helical springs.

TEXT BOOKS:
1. Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.
2. Strength of Materials by R. Subramanian., Oxford University Press, Third Edition, 2016.

REFERENCE BOOKS:
1. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West PressPvt.Ltd., 2005.
2. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.
3. Strength of materials by S. Ramamrutham,DhanpatRai Publishing Company Pvt. Ltd., 2011

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3
CO2	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3
CO3	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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BUILDING MATERIALS, PLANNING AND CONSTRUCTION
II B.Tech – I Semester (Code:18CE304)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course objectives

- Develop knowledge of material science and behaviour of various building materials used in construction.
- Identify the construction materials required for the assigned work.
- Provide procedural knowledge of the simple testing methods of cement, lime and concrete etc.
- List the requirements and different types of stairs.

Course outcomes

CO1 Understand the students about the characteristics of construction materials used in civil engineering.
CO2 Analyze the students about the various stages of building construction steps of masonry work, floors, roofs etc.
CO3 Apply the skills for students about the identification of suitable damp proofing stages, staircases types and about the temporary supporting structures used while construction of a building.
CO4 Analyze the inputs required to help them attain professional expertise and establish themselves as building planners.

UNIT – I

1. Stones
Qualities of a good building stone, Common building stones of India.
2. Bricks
General; Composition of good brick earth; Harmful ingredients in brick earth; Manufacture of bricks by clamp burning and kiln (only Hoffman's kiln) burning, Qualities of good bricks; Tests for bricks; Classification of bricks; Size and weight of bricks
3. Lime
General; Some definitions; Sources of lime; Constituents of limestones; Classification of limes; Properties of fat lime and hydraulic lime;
4. Timber
Definition; Structure of a tree; Qualities of good timber; Decay of timber; Preservation of timber; Advantages of timber construction; Uses of timber;

UNIT –II

5. Stone & Brick Masonry
Technical terms; Types of bonds in brickwork and their suitability. Classification of stone masonry
6. Walls
Classification of walls.
7. Floors
Technical terms; Types of ground floors
8. Roofs
Technical terms; Classification of roofs; Steel sloping roofs; Roof covering materials; Types of flat roofs;

UNIT –III

9. Staircases
Technical terms; Types of stair-cases, design considerations.

10. Dampness And Damp Proofing
Causes of dampness; Methods of preventing dampness; Damp proofing materials and their classification; Methods of providing DPC under different situations.

11. Scaffolding, Shoring, Under Pinning and Form Work
Types of scaffolding; Types of formwork; Centering.

UNIT –IV

12. An Approach To Planning
Site planning; Space requirement–Establishing areas for different units, Furniture requirements, Roominess, Flexibility, Sanitation, Lighting, Ventilation, Space for equipment for air–conditioning, Space for machinery etc.; Flow diagram and line plan–Grouping, Circulation, Orientation, Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Architectural composition–Unity, Mass composition, Contrast, Proportion, Scale, Accentuation and rhythm.

13. Building Rules And Bye–Laws
Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index.

15. Building Elements
Conventional signs; Guidelines for staircase planning; Guidelines for selecting doors and windows; Terms used in the construction of door and window.

TEXT BOOKS

1. Engineering Materials by S. C. Rangwala; Charotar Publishing House, Anad.
2. Building construction by B. C. Punmia et all; Laxmi Publications, New Delhi.
3. Planning and Designing Buildings by Yashwant S. Sane, Allies Book Stall.

REFERENCE

1. Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGrqw-Hill, New Delhi.
2. Building Materials by SK Duggal

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	2	2	2	3	2	-	-	-	-	2	3	3	-	2
CO2	3	2	2	2	2	2	-	-	-	-	-	2	3	3	-	2
CO3	3	2	1	3	2	-	2	-	-	-	-	2	3	3	-	2
CO4	3	3	1	3	3	-	2	-	-	-	-	2	3	3	1	2

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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FLUID MECHANICS
II B.Tech – I Semester (Code: 18CE305)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To familiarize with the properties of fluids and the applications of fluid mechanics.
- To formulate and analyze problems related to calculation of forces in fluid structure interaction with the application of the energy equation.
- Ability to understand types of flows and analyze fluid flow problems and Concept of Boundary Layer.
- To determine the losses in a flow system and flow through pipes.

Course Outcomes: Students will be able to

CO1 Understand with the properties of fluids and the applications of fluid statics.
CO2 Apply the concepts of Continuity equation to measuring the flow through the devices.
CO3 Analyze the concept of fluid measurement and Boundary Layer.
CO4 Analyze flow through pipes.

UNIT I

Properties of Fluids: Specific gravity, viscosity, surface tension and Capillarity.
Fluid Statics:Pascal's law, hydrostatic law, measurement of pressure-simple and differential manometers, Total pressure and centre of pressure on vertical, horizontal and Inclined surfaces.
Buoyancy: Meta-centre and meta-centric height**,** Stability of submerged bodies and floating bodies.

UNIT II

FluidKinematics: Classification of flows: Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Streamline; Path line; Streak line; Continuity equation; Velocity potential and stream function.
Fluid Dynamics: Euler's equation of motion; Bernoulli's equation.
Flow Measurement in Pipes: Discharge through a venturimeter and orificemeter; Measurement of velocity by pitot tube.

UNIT III

Orifice and Mouthpiece: Introduction to orifices (Small and large) and mouth pieces.

Notches: Discharge over a Rectangular andTriangular notch.

Boundary Layer Theory: Boundary layer concepts, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of Boundary layers.

UNIT IV

Flow Through Pipes:Momentum equation, Force exerted by flowing fluid on pipe-bend, major and minor energy losses, hydraulic gradient and total energy line, pipes in series and parallel; Reynolds's experiments of pipe flow.

TEXT BOOKS:

1. Hydraulics and Fluid Mechanics by P. N. Modi& S. N. Seth; Standard book house; New Delhi
- Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications; New Delhi.

REFERENCE BOOKS:

2. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi, 2008
3. Fluid Mechanics by Streeter and wyile, McGrawhil Publications.
4. Fluid Mechanics by S K Som& G Biswas (TMH)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	-	-	-	-	-	-	-	-	1	3	2	-	2
CO2	3	3	2	-	-	-	-	-	-	-	-	1	3	2	-	2
CO3	3	2	2	-	-	-	-	-	-	-	-	2	3	3	-	2
CO4	3	2	2	-	-	1	-	-	-	-	-	2	3	3	1	2

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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INDIAN CONSTITUTION
II B.Tech – I Semester (Code :18HU001)

Lectures	2	Tutorial	0		Practical	0	Credits	0
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To provide basic information about fundamental law of the country.
- To educate the student about fundamental Rights and fundamental duties of citizens.
- To educate the students about Government organs, methods of functioning
- To motivate students to leave narrow selfish outlook and inculcate broad national, human outlook.

Learning out Comes: Upon the successful completion of the course the student will be able to

CO1 Understand the importance of the constitution in a Democratic Society.
CO2 Understand the Fundamental Rights, Duties of a citizen by discharging his duties to become a good citizen.
CO3 Remember about Judicial supremacy and Independence of judiciary and fight for his legitimate Rights through court of law.
CO4 Applying the principles to participate in the democratic process of governance and in nation building activities.

UNIT-I

1. Meaning of the constitutional law and constitutionalism.

2. Historical perceptive of the constitution of India

3. Salient features and characteristics of the constitution of India.

4. Preamble,unionand its territory andcitizenship.

UNIT – II

5. Fundamental rights principles.

6. Directive principles of state policy.

7. Fundamental Duties.

8. The government of the union, the president, The Prime Minister, and the council of ministers,
The parliament of India, The supreme court, the union judiciary

UNIT – III

9. The Machinery of Government in the states, The Governor, The Chief Minister and council of
Ministers, The State legislature, High court, Judiciary in the states

10. Union territories.

11. The Federal System, Division of powers between centre and states, Legislative Administration andfinancial relation.
12. Emergency Provisions, President Rule, National Emergency, Financial Emerging
13. Local self Government, Panchayat Raj, Municipalities and municipal Corporation.

UNIT IV

13. Local self Government, Panchayat Raj, Municipalities and municipal Corporation

14. Miscellaneous Provisions, The comptroller and Auditor general of India, The Public Service
Commission, Special Provisions relating to certain classes, Elections – Political parties.

15. Amendment of the Constitution.

REFERENCE BOOKS:

1. Constitutional Government in India - M V Pylee – Asia Publishing House
2. Indian Government and Politics – D C Dasgupta. Vikas Publishing house
3. The Oxford Hand Book of the Indian Constitution, SujitChowdary, MadhavKhosla PratapabhemMehla.
4. Constitutional question in India ; The President , Parliament and the States – Noorani A G – Oxford.
5. Indian Constitution and its features – Astoush Kumar, Anmol Publishers
6. The Constitution of India – Bakshi P M – Universal Law Publishers
7.Legelect's the constitution of India – RamnarainYadav, K KLegelest Publication

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	3	3	2	3	-	-	3	-	-	-	-
CO2	-	-	-	-	-	3	1	2	1	-	-	3	-	-	-	-
CO3	-	-	-	-	-	3	1	2	1	-	-	3	-	-	-	-
CO4	-	-	-	-	-	3	3	2	3	-	-	3	-	-	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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BUILDING DRAWING LAB
II B.Tech – I Semester (Code :18CEL31)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To learn basic commands of Auto CAD software.
- To draw conventional signs, symbols of materials used in a building drawing.
- To draw the building elements like door, window, foundation and staircase etc
- To draw plan, section and elevations of buildings and various building components.

Course Outcomes:

CO1 Understand Basic Auto CAD commands.
CO2 Understand Various conventional signs, symbols of materials and building elements like door, window and foundation etc.
CO3 Understand principles of planning, principles of building bye-laws and ability to draw the line diagrams as per National Building Code.
CO4 Prepare Drawing plan, section and elevations of buildings and various building components.

PART A:Basics and introduction to building drawing:

Introduction to building drawing, Importance of building drawing, scale , legend, direction, units limits,definition-plan,section,elevation, plotting, Learning basic commands of AUTO CAD software.

PART B: Using drawing tools and Auto cad software:

(1) Drawing conventional signs.
(2) Drawing and guidelines for door, window,
(3) Drawing and guidelines for staircase and foundation.
(4) Draw Plan, sections and Elevation of a single room building.
(5) Drawing plan, sections and Elevation of single storey residential building.
(6) Drawing plan, sections and Elevation of two storied residential building.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes															
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	-	3	-	3	-	-	-	-	-	-	3	-	2	-	2
CO2	2	-	3	-	3	-	-	-	-	-	-	3	-	3	-	2
CO3	2	-	3	-	3	2	2	2	-	-	-	3	-	3	-	3
CO4	2	-	3	-	3	2	2	2	-	-	-	3	-	3	-	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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ENGINEERING GEOLOGY LAB
II B.Tech – I Semester (Code :18CEL32)

Lectures	2	Tutorial	0	Practical	3	Credits	2
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To Identify the Formation of Minerals.
- To Understand the Megascopic Identification of Rocks and Minerals.
- To Understand Geological Maps.
- To inspire the students to think clearly and critically the solution of the civil engineering problems in the context of geological knowledge

Course Outcomes: Students will be able to

CO1 Knowledge: Recognize and describe geological materials and processes relevant to engineering.

CO2 Comprehension: Explain how geological factors impact site stability and interpret geological data.

CO3 Application: Apply geotechnical testing and geological knowledge to make recommendations for engineering projects.

CO4 Analysis: Analyze geological data and engineering problems to assess risks and propose mitigation strategies for different geological scenarios.

Theory:

1. Fundamentals of Photogrammetry, Study of Satellite imageries and SOI Toposheets.
2. Branches of Geology& Weathering.
3. Brief View on Mineralogy, Petrology, Structural Geology.
4. Geophysical Investigations

List of Experiments:

1. Fundamentals of Photogrammetry and Photo interpretation – types of photographs; Vertical photographs
2. Study of Survey of India Topographical Maps
3. Interpretation of Contour maps
4. Study of Satellite Imageries
5. Megascopic identification of minerals
6. Identification of Igneous rocks
7. Identification of Sedimentary rocks
8. Identification of Metamorphic rocks
9. Structural Geology-Problem on strike, Dip.
10. Study and Observation of folds, faults and joints.
11. Structural Geology-Completion of outcrops maps, order of superposition.

Demo & Calculation only:

12. Seismic Hammer Sounding Method
13. Electrical Resistivity Method (Vertical Electrical Sounding)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes															
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	-	3	-	3	2	-	-	2	3	-	2	-	-	2
CO2	3	3	-	3	-	3	-	-	-	2	3	-	3	-	-	2
CO3	3	3	-	3	-	3	-	-	-	2	3	-	3	-	-	2
CO4	3	3	-	3	-	3	-	-	-	2	3	-	3	-	-	2

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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SURVEYING LAB
II B.Tech – I Semester (Code: 18CEL33)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives

- To measure chainage of a line using tape and chain and recording of details along the chain line.
- To find the included angles and local attraction of traverse by using compass.
- To determine the elevation difference between two points & eliminate errors due to curvature of earth and refraction.
- To plot a building by using plane table surveying.
- To measure the horizontal and vertical angles of various points by theodolite.

Course Outcomes: By the end of the course the students will be able

CO1 Understand conducting of various surveying tasks including measuring the area of plots using Cross Staff survey.
CO2 Understand Conducting of compass traversing.
CO3 Determining inaccessible distances using both compass and theodolite surveys, measuring horizontal and vertical angles with theodolite.
CO4 Understand Conducting leveling tasks for different scenarios, determining approximate elevations for reconnaissance surveys, and plotting longitudinal sections of routes using profile leveling.

EXPERIMENTS

1. Measurement of area of the plot using Cross staff survey.
2. Traversing by compass and its adjustment.
3. Determination of inaccessible distance using compass survey.
4. Measurement of Horizontal angle by using theodolite.
5. Measurement of Vertical angle by using theodolite.
6. Determination of inaccessible distance using theodolite survey.
7. Determination of difference between two points by simple leveling.
8. Determination of difference between no. of points which are at diff distances by differential levelling.
9. Determination of approximate elevations for reconnaissance survey by Fly leveling.
10. Determination of difference between two points which are separated by some obstruction by reciprocal leveling.
11. Plotting of the longitudinal section of any route by profile leveling.

TEXT BOOKS AND REFERENCES:

1. Surveying Vol-I by Dr K.R. Arora.
2. Surveying Vol-I by Dr B. C. Punmia.
3. Plane surveying by A M Chandra

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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PROFESSIONAL PRACTICE, LAW & ETHICS
II B.Tech – II Semester (Code :18CE401)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives

- To create awareness on professional ethics and Human Values
- To create awareness on Engineering Ethics providing basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues.
- To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards
- To inculcate knowledge and exposure on Safety and Risk, Risk Benefit Analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual Property Rights
- To have an adequate knowledge about MNC's, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.

Course Outcomes

CO1 To Build awareness on Engineering Ethics providing basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues.
CO2 To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards.
CO3 To inculcate knowledge and exposure on Safety and Risk, Risk Benefit Analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual Property Rights.
CO4 To have an adequate knowledge about MNCs, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.

UNIT – I

1.Human Values

What is engineering – who is an engineer- Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue- Respect forOthers – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-Operation –Commitment – Empathy – Self-Confidence – Character - Spirituality.

UNIT – II

2. Engineering Ethics

Senses of Engineering Ethics – Variety of Moral Issued – Types of Inquiry – Moral Dilemmas –Moral Autonomy – Kohlberg's Theory – Gilligan's Theory – Consensus and Controversy – Professions and Professionalism- Professional Ideals and Virtues -Theories About Right Action –Self-Interest – Customs and Religion – Uses of Ethical Theories.

UNIT – III

3. Engineering as Social Experimentation

Engineering as Experimentation – Engineers as Responsible Experimenters – Codes of Ethics – Balanced Outlook on Law.

4. Safety, Responsibilities and Rights

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk. Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights –

Intellectual Property Rights (IPR) – Discrimination.

UNIT – IV

5. Global Issues

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development– Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors –Moral Leadership

Sample Code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India),Indian Institute of Materials Management, Institution of Electronics and TelecommunicationEngineers (IETE), India Etc.,

TEXT BOOK

1. Mike martin and Ronald Schinzinger, "Ethics in Engineering" McGraw-Hill, New York 1996
2. Govindarajan M, Natarajan S, Senthil Kumar V.S., "Engineering Ethics", PHI, New Delhi, 2004

REFERENCE BOOKS

1. Charles D,Fleddermann, "Engineering Ethics", Pearson / PHI, New Jersey 2004 (Indian Reprint)
2. Charles E Harris, Michael S.Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases" Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the conduct of business" Pearson, New Delhi, 2003.
4. Edmund G.Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2001.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	1	1	3	1	2	-	-	-	3	-	-
CO2	-	-	-	-	-	3	2	3	-	1	-	-	-	3	-	-
CO3	-	-	-	-	-	3	2	1	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	3	2	2	-	1	3	-	-	3	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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ENVIRONMENTAL ENGINEERING
II B.Tech – II Semester (Code: 18CE402)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives

- To estimate the quantity of drinking water and domestic wastewater generated
- To explain the various types of water and wastewater characteristics
- To demonstrate the common physical, chemical and biological unit operations encountered in treatment processed
- To identify and design various methods available for the treatment of water and wastewater

Course Outcomes

CO1 Analyse and Estimate the quantity of water requirement on basis of per capita consumption and forecasting population. And various physico-chemical tests conducted to water.

CO2 Apply the basic knowledge for the design of various methods available for the treatment of water and design of distribution system.

CO3 Understand the physical, chemical and biological characteristics of wastewater and quantity estimation for the purpose of sewer design.

CO4 Apply the basic knowledge for the design of various methods available for the treatment of wastewater.

UNIT-I

Water Supply: Objectives of water supply scheme, Estimating requirements; Design period; Per capita consumption; Factors affecting per capita consumption; Fire demand; Fluctuations in demand; Population forecasting methods.

UNIT-II

Water treatment and Distribution: Design of water treatment units such as sedimentation, Coagulation, filtration and disinfection; Methodsof Distribution,Layout

of Distribution system; Analysis of Distribution by Hardy Cross method and practice for simple networks.

UNIT-III

Introduction to Sanitary Engineering: Conservancy and water carriage system; Sewerage systems; Relative merits and Demerits; Design of sewers; Characteristics of sewage, Expression for BOD.

Sewer Appurtenances Man holes, Drop man holes, Flushing tanks, Street inlets; Catch basins; Storm water regulators;

UNIT-IV

Preliminary and Primary Treatment of Sewage

Preliminary and Primary Treatment Operations:Screens,GritChambers,SkimmingTank and Sedimentation Tank

SecondaryTreatment:

Trickling filters; Principles of action; Filter types; Recirculation; Final settling tanks; Operational problems and remedies;

Activated sludge process; Features of operation; Organic loading parameters; Methods of aeration; Sludge bulking; Sludge volume index.

TEXT BOOKS:

1. Elements of public health engineering by K.N. Duggal; S.Chand& Company Ltd., New Delhi.
2. Environmental Engineering Vol.I – Water supply engineering by S.K. Garg; Khanna Publishers, Delhi
3. EnvironmentalEngineering Vol.II– Sewage disposal and air pollution engineering by S.K.Garg; KhannaPublishers, Delhi
4. Water Supply and Sanitary Engineering by G.S. Bride; Dhanpatrai and sons, Delhi
5. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

REFERENCE BOOKS:

1. Metcalf and Eddy, Waste water Engineering Collection,Treatment,DisposalandReuse,McGrawHill Pub. Co.,1995.
2. H.MRaghunath, Hydrology Principles,AnalysisandDesign,NewAgeInternationalPublishers,1996.
3. Michael,A.M,'IrrigationTheory&Practice,Vikas Publishing House,NewDelhi,1978
4. Benefield L.D. and Randall C.D. Biological Process Designs for Wastewater Treatment, Prentice Hall Pub. Co.,1980.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	2	1	1	-	3	2	1	-	-	-	2	1	-	-	3
CO2	3	3	1	1	-	3	2	1	-	-	-	2	-	-	-	2
CO3	2	2	1	1	-	3	2	1	-	-	-	2	1	-	-	3
CO4	3	3	1	1	-	3	2	1	-	-	-	2	-	-	-	2

BAPATLA ENGINEERING COLLEGE::BAPATLA
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MECHANICS OF MATERIALS
II B.Tech – II Semester (Code: 18CE403)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives: The objectives of this Course are

- To understand multi-axial stresses and principal stresses and principal strains;
- To analyse structural members under compound stresses;
- To derive expression for critical load carrying capacity of columns under different load conditions and apply various failure criteria for general stress states at points;
- To determine deflections of beams using energy theorems;
- To determine deflections of beams using geometrical methods.

Course Outcomes: On completion of the course the student will be able to

CO1 Analyze the principal stresses for plain stress problems and computing the compound stresses due to normal and shear stress.
CO2 Understand the buckling concepts of long columns and theories of failures.
CO3 Applying the strain energy concepts to determine the deflections of determinate beams.
CO4 Determines the deflection of statically determinate beams by geometrical methods.

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UNIT-I

1. Analysis of Plane Stress

Introduction-The basic problem-Equations for transformation of plane-stress-Principal planes and Principal stresses -Maximum shear stresses-Mohr's circle of stress-Construction of Mohr's circle.

2. Compound Stresses

Introduction- principal of Superposition and its limitation- Superposition of normal stresses- Eccentrically loaded short columns- Core or kernel of a section- Superposition of shear stresses.

UNIT-II

3. Buckling Of Columns

Introduction-Examples of instability- Criteria for stable equilibrium- Euler load for column with pinned ends- Euler loads for columns with different end restraints-Limitations of the Euler's formulae- Generalized Euler buckling load formulae- Eccentric loads and the secant formula.

4. Failure Theories

Introduction- maximum normal stress theory- maximum shearing stress theory- maximum strain energy theory- maximum distortion energy theory - comparison of theories.

UNIT-III

6. Deflections of Statically Determinate Structures (Energy Mehods)

Strain energy due to bending - Maxwell's reciprocal theorem- Maxwell–Betti'sgeneralised reciprocal theorem- Castigliano's theorems- Application of Castigliano's theorem for calculating deflection of beams, frames and trusses- Virtual work method for deflections

UNIT-IV

7. Deflections of Statically Determinate Beams (Geometrical Methods)

Introduction- strain-curvature and Moment-Curvature relation- Governing differential equation for deflection of elastic beams- Alternative differential equations of elastic beams- solution of beam deflection problem by Direct integration and Macaulay's- Introduction to moment area method- Derivation of Moment area theorems- conjugate-beam method- slope and deflection of beams using moment area method and conjugate-beam method.

TEXT BOOKS:

1. Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.
2. Strength of Materials by R. Subramanian., Oxford University Press, Third Edition, 2016.

REFERENCES:

1. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West PressPvt.Ltd., 2005.
2. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.
3. Strength of materials by R. K. Bansal, Lakshmi Publications (P) Ltd., 2007

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3
CO2	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3
CO3	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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HYDRAULICS & HYDRAULIC MACHINES
II B.Tech – II Semester (Code: 18CE404)

Lectures	3	Tutorial	1	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- Design of open channels for most economical sections like rectangular, trapezoidal and circular sections
- Understand Gradually Varied flow and Rapidly Varied Flow though the channels and its applications
- Understand the mechanics of impact of jet on various types of vanes and design of Impulse and Reaction Turbines
- To understand concept of centrifugal pump and dimensional analysis of a given set of variables using Buckingham's π theorem and relate the model and prototype.

Course Outcomes: Students will be able to

CO1 Analyze the flow through open channels.
CO2 Apply the concepts of Gradually Varied flow and Rapidly Varied Flow.
CO3 Analyze the impact of jets and turbines problems with the application of the momentum equation.
CO4 Analyze the characteristics flow the centrifugal pumps and dimensional analysis.

UNIT I

Open Channel Flow (Uniform Flow): Comparison between open channel flow and pipe flow, Types of channels, Chezy's and Manning's equation, Flow through a Rectangular, Trapezoidal and Circular channels. Most efficient channel section of Rectangular, Trapezoidal and Circular.

Open Channel Flow (Non uniform Flow): Specific energy, Specific energy diagram, Critical flow, critical flow in rectangular channel, Channel transitions.

UNIT II

Gradually Varied Flow (GVF): Gradually varied flow in rectangular channel, Classification of channel slopes, classification of surface profiles.

Rapidly Varied Flow (RVF): Hydraulic jump, elements and characteristics of hydraulic jump, Types of hydraulic jump, Location and applications of hydraulic jump, Energy loss in a hydraulic jump and Backwater curve length.

UNIT III

Impact of Jets: Force exerted by the jet on a stationary and moving plates – vertical, inclined and curved, force exerted by jet on flat plates series of vanes.

Turbines: Classification of turbines and working principles of turbines, draft tube-types, draft tube theory, specific speed and unit quantities.

UNIT IV

Centrifugal Pumps: Manometric head; losses and efficiencies; work done, working principle; priming; velocity triangles; performance and characteristics curves; multistage pumps and cavitation effects.

Dimensional analysis & Model similitude: Introduction, Rayleigh's method and Buckinghamπ theorem, Types of similarities, Dimensionless numbers.

TEXT BOOKS:

1. Hydraulics and Fluid Mechanics by P. N. Modi& S. N. Seth; Standard book house; New Delhi
2. Fluid Mechanics by R. K. Rajput; S.Chand Publishers.

REFERENCE BOOKS:

1. Fluid Mechanics by Streeter and wyile, McGrawhill Publications.
2. Flow in Open Channel by K.Subramanya, Tata McGrawhill Publications.
3. Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	2	-	-	-	-	-	-	-	-	1	3	2	-	2
CO2	3	3	2	-	-	-	-	-	-	-	-	1	3	2	-	2
CO3	3	2	2	-	-	2	-	-	-	-	-	2	3	3	-	2
CO4	3	2	2	-	-	2	-	-	-	-	-	2	3	3	-	2

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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CONCRETE TECHNOLOGY
II B.Tech – II Semester (Code :18CE405)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives: The course should enable the students to

- Discuss the physical and chemical properties of cement and admixtures.
- Understand the workability of concrete, manufacturing processes of concrete and the behavior of the hardened concrete.
- Identify, formulate and solve problems in concrete mix design.
- Enrich the practical knowledge on mix design principles, concepts and methods.

Course Outcomes:

CO1 Interpret the basic physical and chemical properties of cement, admixtures and aggregates.
CO2 Interpret the properties and factors influencing the workability of fresh concrete.
CO3 Interpret various tests for determining strength of concrete and effect of water/cement ratio on the strength of hardened concrete.
CO4 Apply the basic concepts and applications of concretes and special concretes, determine various mix proportions of concretes.

UNIT-I

1. Cement
General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration.

2. Types Of Cements
Ordinary Portland cement, Rapid hardening cement, Sulphate resisting cement, Slag cement, Quick setting cement, Super sulphated cement, Portland pozzolana cement, air entraining cement, coloured cement, expansive cement,High alumina cement.

3. Testing, Handling and Uses of Cement
Fineness of cement using sieve test and air-permeability method, Normal consistency and setting times using vicat apparatus, soundness test using Le-chatlier apparatus, Grades of cement as per IS specifications, physical and chemical requirements of OPC for different grades of cement.

4. Aggregates
Classification, source, size and shape texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, methods used for determination of moisture content of aggregates, grading of aggregates, sieve analysis, standard grading curve, grading limits of fine aggregates as per IS.

UNIT-II

5. Water

Quality of water for mixing concrete, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000.

6. Admixtures and Construction Chemicals

General, plasticizers and super plasticizers – Dosage, mixing procedure, equipment, effect of super plasticizes on the properties of hardened concrete, Retardors, accelerators. Air-entraining admixtures, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on compressive strength of concrete.

7. Fresh Concrete

Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration.

UNIT-III

8. Hardened Concrete

General; water-cement ratio; gel/space ratio; gain of strength with age; maturity concept of concrete; effect of maximum size of aggregate on strength.

9. Test on Hardened Concrete

Compression test; moulds and compacting; curing; failure of compression specimen; effect of height/diameter ration strength; flexural strength of concrete; tensile strength of concrete; non-destructive testing methods (R.H Test and U V Test)

10. Durability of Concrete

Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

UNIT-IV

11. Introduction To Special Concretes And Concreting Methods

a) Fibre reinforced concrete; Fibers used, factors effecting properties, aspect ratio of fibers, orientation of fibers, workability, mixing, applications, current development in FRC.

b) Light-weight concrete: Natural and artificial light-weight aggregates, properties of common light-weight concretes

c) High performance concrete.

12. Proportioning Of Concrete Mixes

Concept of mix design, variables in proportioning, different methods of mix design, nominal mix and design mix, Indian standard method of mix design (IS 10262-2019).

TEXT BOOK

1. Concrete technology by M.S.Shetty, S.Chand& Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Properties of concrete by A.M.Neville, Longman Publishers

2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	-	-	-	-	-	-	-	-	-	1	3	-	2
CO2	3	2	1	-	-	-	-	-	-	-	-	-	1	3	-	2
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	3	-	2
CO4	3	2	1	-	-	-	-	-	-	-	-	-	1	3	-	2

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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TECHNICAL ENGLISH
II B.Tech – II Semester (Code :18EL002)

Lectures	3	Tutorial	0	Practical	0	Credits	2
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives: The course aims to upgrade the spoken and written English of the Civil Engineering students from an intermediate to advanced level, and to help them overcome their fear of public speech.

- It will also focus on introducing the basic research skills and writing skills affiliated to research.
- It also aims to inculcate confidence and to groom their personality so that they can aim at executive level jobs.
- The career focus of this course is to build the combination of language and interpersonal skills needed to work independently, to lead teams effectively, and to become customer focused and result driven in their approach.
- Special emphasis is also laid on developing individual and group effort through virtual and real life trainings, presentations, projects and research, especially towards developing their leadership qualities and the ability, to improve team functioning and team output.

Course Outcomes: By the end of the course, students will be able to

CO1 Use English language appropriately for functional skills like listening, reading, writing and speaking.
CO2 Demonstrate essential skills required for effective written and oral communication.
CO3 Construct grammatically correct sentences and the use of appropriate punctuation.
CO4 Use English idioms and phrasal verbs effectively.

UNIT-I

1.1 Vocabulary Development: Familiarising Idioms & Phrases
1.2 Grammar for Academic Writing: Making Requests
1.3 Language Development: Using Transition & Link words
1.4 Technical Writing: Letter Writing & Email Writing

UNIT-II

2.1 Vocabulary Development: Analogous words, Gender Sensitive language
2.2 Grammar for Academic Writing: Tenses: Simple Past /Present Perfect, The Future: Predicting & Proposing
2.3 Language Development: Cloze tests
2.4 Technical Writing: Technical Reports

UNIT-III

3.1 Vocabulary Development: Abbreviations& Acronyms
3.2 Grammar for Academic Writing: Describing(People/Things/Circumstances) : Adjectival & Adverbial groups
3.3 Language Development: Transcoding (Channel conversion from chart to text)
3.4 Technical Writing: Circular, Memos, Minutes of Meeting

UNIT-IV

4.1 Vocabulary Development: Corporate vocabulary
4.2 Grammar for Academic Writing: Inversions & Emphasis
4.3 Language Development: Reading Comprehension
4.4 Technical Writing: Resume Preparation

REFERENCE BOOKS

1. Communication Skills, Sanjay Kumar &PushpaLatha. Oxford University Press: 2011.
2. Technical Communication Principles and Practice. Oxford University Press: 2014.
3. Advanced Language Practice, Michael Vince. MacMilan Publishers: 2003.
4. Objective English (Third Edition), Edgar Thorpe &Showick. Pearson Education: 2009
5. English Grammar: A University Course (Second Edition), Angela Downing & Philip Locke, Routledge Taylor & Francis Group: 2016

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	-	-	2	2	3	2	2	-	-	2	-
CO2	-	-	-	-	-	-	-	2	2	3	2	2	-	-	2	-
CO3	-	-	-	-	-	-	-	2	2	3	2	2	-	-	2	-
CO4	-	-	-	-	-	-	-	2	2	3	2	2	-	-	2	-
CO5	-	-	-	-	-	-	-	2	2	3	2	2	-	-	2	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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HYDRAULICS &HYDRAULIC MACHINES LABORATORY
II B.Tech – II Semester (Code: 18CEL41)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To understand the flow measurement in a pipe flow.
- Characterization of laminar and turbulent flow.
- To determine the energy loss in pipe flow.
- To study the characteristics of turbines.
- To study the characteristics of pumps.
- To measure the discharge in a open channel flow.

Course Outcomes: On completion of the course, the students will be able to:

CO1 Determining the Coefficient of Discharge using a Venturi meter, Orifice meter, Orifices, Mouth Pieces, Rectangular notch and V-Notch.
CO2 Understanding the Characterization of Laminar & Turbulent flows by Reynolds apparatus.
CO3 Determining the friction factor for pipes of different diameters and verifying Bernoulli's equation.
CO4 Understanding the Measurement of force due to impact of jet on vanes of different types.
CO5 Estimating the Performance studies on Pumps and Turbines.

EXPERIMENTS

1. Verification of Bernoulli's theorem.
2. Venturimeter: Determination of Coefficient of discharge.
3. Orificemeter: Determination of Coefficient of discharge.
4. Orifices: Determination of Coefficient of discharge.
5. Mouthpieces: Determination of Coefficient of discharge.
6. Characterization of laminar and turbulent flows by Reynold's apparatus.
7. Determination of friction factor of Pipes.
8. Determination of loss of head in pipes due to bends, sudden contractions and sudden expansion.
9. Determination of Coefficient of discharge for Rectangular and V – notches.
10. Determination of Manning's and Chezy's coefficients in open channel.
11. Measurement of force due to impact of jets on vanes of different types.
12. Performance studies on Pelton turbine.
13. Performance studies on Francis turbine/Kaplan turbine.
14. Performance studies on single stage Centrifugal pump.

15. Performance studies on Reciprocating pump.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	1	1	2	3	-	-	-	-	-	-	-	-	1	2	-	3
CO2	1	1	2	3	-	-	-	-	-	-	-	-	1	2	-	3
CO3	1	1	2	3	-	-	-	-	-	-	-	-	1	2	-	3
CO4	1	1	2	3	-	-	-	-	-	-	-	-	1	2	-	3
CO5	1	1	2	3	-	-	-	-	-	-	-	-	1	2	-	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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ENVIRONMENTAL ENGINEERING LABORATORY
II B.Tech – II Semester (Code: 18CEL42)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To determine the physical characteristics of drinking water/sewage – turbidity.
- To determine chemical characteristics of drinking water/sewage – pH, various types of solids, acidity, alkalinity, D.O etc.
- To estimate optimum dosage of coagulant (Alum)
- To determine the chlorine dosage and residual chlorine in treated water sample.
- To determine the Bio-chemical and Chemical Oxygen Demands of sewage.
- To train the student for checking the suitability of water for construction and drinking purposes.

Course Outcomes: At the end of the course the student will be able to:

CO1 Determining the econcentration of solids in water/sewage.
CO2 Understanding the estimation procedures for chemical characteristics like pH, Acidity, Alkalinity, Hardness etc. of water/sewage.
CO3 Determining the optimum dosage of coagulant (Alum) by Jar test apparatus.
CO4 Determining the freshness of water/sewage by conducting Wrinklers test (D.O.Test).

EXPERIMENTS

1. Determination of total suspended and dissolved solids in water / sewage sample.
2. Determination of fixed and volatile solids in water / sewage sample.
3. Determination of Settleable Solids.
4. Determination of turbidity of water / sewage sample.
5. Determination of pH value of water / sewage sample.
6. Determination of optimum dosage of coagulant.
7. Determination of residual chlorine.
8. Determination of temporary and permanent hardness of water sample.
9. Determination of chloride concentration of water / sewage sample.
10. Determination of acidity of water sample.
11. Determination of alkalinity of water sample.
12. Determination of fluorides in water sample.
13. Determination of Dissolved Oxygen of water / sewage sample.
14. Determination of Biochemical Oxygen Demand (BOD) of waste water.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	-	2	-	2	3	-	-	1	1	-	3	-	-	2
CO2	2	2	-	2	-	2	3	-	-	1	2	-	3	-	-	2
CO3	3	3	-	2	-	3	3	-	-	-	-	-	3	-	-	1
CO4	3	2	-	2	-	2	3	-	-	-	1	-	3	-	-	1

BAPATLA ENGINEERING COLLEGE: BAPATLA
(Autonomous)
MATERIALS TESTING LABORATORY
II B.Tech – II Semester (Code: 18CEL43)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. The main objective of this laboratory is to make the students to know the basic tests on materials used for construction.

Course Outcomes:

CO1 To determine the properties of concrete ingredients.
CO2 To determine the fresh and hardened properties of concrete.
CO3 To estimate the surface strength and quality of concrete by using NDT equipment's.
CO4 To determine the properties of steel.

Experiments

1. **Cement tests**
   a. Fineness of cement
   b. Specific gravity of cement
   c. Normal consistency of cement
   d. Initial setting time of cement
   e. Compressive strength of cement.
2. **Fine aggregate tests**
   a) Specific gravity of fine aggregate
   b) Sieve analysis of fine aggregate
   c) Bulking of sand.
3. **Coarse aggregate tests**
   a) Specific gravity of coarse aggregate
   b) Sieve analysis of coarse aggregate.
4. **Mix design as per IS 10262:2019.**
5. **Concrete tests**
   a) Workability tests (Slump & Compaction factor)
   b) Compressive strength of concrete.
   c) Split tensile test.
   d) Modulus of rupture
6. NDT – Rebound hammer testing & UPV
7. Stress-Strain characteristics of mild steel bar.& HYSD
8. Determining shear strength of mild steel bar & HYSD Bar
9. Hardness test of Steel & Brass
10. Determining Young's Modulus of Steel and Wood (using simply supported beam)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	1	1	-	3	-	-	-	-	-	3	-	-	-	-	-	3
CO2	1	1	-	3	-	-	-	-	-	3	-	-	-	-	-	3
CO3	1	1	-	3	3	-	-	-	-	3	-	-	-	-	-	3
CO4	1	1	-	3	-	-	-	-	-	3	-	-	-	-	-	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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STRUCTURAL ANALYSIS
III B.Tech – I Semester (Code:18CE501)

Lectures	4	Tutorial	1		Practical	0	Credits	4
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives

- Provide an analysis for three hinged arches and suspension bridges for different type of loads and their supports are at different levels.
- To analyze the statically indeterminate beams by using method of Consistent deformation.
- To analyze the statically indeterminate beams and frames by using displacement methods (Slope deflection method and Moment distribution method)
- The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads rolling on simply supported and continuous girders and Pratt and Warren trusses.

Course Outcomes: Upon successful completion of this course the student will be able to

CO1 Solve the Arches and Cable structures.
CO2 Apply the Method of Consistent Deformation to analyse indeterminate structures.
CO3 Apply the Slope deflection method and Moment distibution method to analyse beams and frames.
CO4 Understand the Concepts of Influence lines for determinate structures.

UNIT-I

1. Arches: Types, Eddy's Theorem; Analysis of three hinged Parabolic and Circular arches for Static loads. Affect of temperature change in arches.

2. Cables:Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self weight; Effect of temperature changes in suspension cables; Anchor cables.

UNIT-II

3. Analysis of indeterminate structures: Introduction to Force methods:

Statically indeterminate structures (method of consistent deformations): Applications for

i. Propped Cantilevers Analysis of propped cantilever by method of consistent deformations.
ii. Fixed Beams Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of support; Effect of rotation of a support; Bending moment diagram for fixed beams.
iii. Clapeyron's Theorem of Three Moments Analysis of continuous beams (Two span continuous beams).

UNIT-III

4. **Analysis of indeterminate structures:** Introduction to Displacement methods:

Kinematically indeterminate structures (slope-deflection method; moment distribution method),

i) Continuous beams for two spans only and

ii) Portal frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT-IV

5.Influence Lines: For Statically Determinate Structures Moving loads and influence lines; Influence lines for beam reactions; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

TEXT BOOKS:

1. S.B,Junnarkar and H.J.Shah,' Mechanics of Structures,Vol. I & Vol. II' CharotarPublications,Anand,India
2. R. Vaidyanathan and P. Perumal, Structural Analysis Volume I & II, Laxmi Publications (P) Ltd., 2017 .
3. Reddy . C.S., Basic Structural Analysis, Tata McGraw Hill, 3e, 2011
4. B.C.Punmia, Ashok Jain, ArunJain , Theory of structures SMTS-2, Laxmi Publications (P) Ltd., 2017 .
5. V. N. Vazirani& M. M. Ratwani ,Structural Analysis, Vol. II , Khanna Publishers,Delhi.

REFERENCE BOOKS:

1. Hibbeler, RC, Structural analysis, Pearson Education, 2012
2. Negi L. S. and Jangid R. S, Structural Analysis, Tata McGraw Hill, 1997
3. Rajasekaran S. and Sankarasubramanian G., Computational Structural Mechanics, PHI, 2008
4. S.S. Bhavikatti, Structural Analysis II, Vikas Publication Houses (P) Ltd, 2016
5. Timoshenko S. P. and Young D. H., Theory of Structures, McGraw Hill, 2e, 1965
6. Wang C. K., Intermediate Structural Analysis, Tata McGraw Hill, 1989

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	-	-	1	-	-	-	-	-	-	3	2	-	-
CO2	2	3	1	-	-	1	-	-	-	-	-	-	3	2	-	-
CO3	2	3	1	-	-	1	-	-	-	-	-	-	3	2	-	-
CO4	3	2	-	-	-	1	-	-	-	-	-	-	3	2	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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REMOTE SENSING & GIS
III B.Tech – I Semester (Code : 18CE502)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- Learn basic concepts of Aerial Photographs.
- Learn basic concepts of remote sensing and its characteristics, satellite sensors and platforms.
- Know about satellite digital image processing and classification techniques.
- Understand the basic concepts GIS, spatial data and analysis.
- Applications of GPS in surveying.
- Know various remote sensing and GIS applications in civil engineering.

Course Outcomes:

CO1 Analyse the principles and components of photogrammetry & Interpret Information from Aerial Photographs.
CO2 Acquaintance with the Foundations of Remote Sensing, Satellite Sensors and Platforms, and Hands-On Experience with Satellite Image Classification.
CO3 Acquire a Fundamental Knowledge of Geographic Information Systems and Cartography. Evaluation of Spatial Data using Overlay Techniques Exposed.
CO4 Discover Ways to Utilise GPS to GeoTag Assets, Add Attributes and Metadata, and Improve Your Awareness of Remote Sensing and GIS in Civil Engineering Applications.

UNIT- I

Photogrammetry

Fundamentals of Photogrammetry and Photo interpretation – types of photographs; Vertical photographs – principal point; scale; Stereoscopy; Vertical exaggeration –factors involved and determination; Overlap, side lap and flight planning.

UNIT – II

Remote Sensing

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere and target –

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, Space-borne remote sensing. Visual Interpretation Techniques.

Overview of Indian Remote sensing satellites and sensors, satellite definition and types, characteristics of satellite, characteristics of satellite orbit, characteristics of Indian satellites - IRS1A, IRS1B, IRS1C, IRS1D, CARTOSAT satellites.

UNIT – III

Geographic Information System (Gis)

Introduction, key components, map projections, data entry &preparation – Spatial data input, Raster Data Model, Vector Data Model, Raster VsVector.advantages and dis advantages of

Raster & Vector, Basic Overlay operations. network analysis - concept and types, Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis.

UNIT - IV

Global Positioning System (GPS)&RS And Gisapplications:

GPS definition, components of GPS, GPS receivers.Space, Control and User segments of GPS.Advantages and disadvantages of GPS, Limitations and applications of GPS Indian Systems (IRNSS, GAGAN)Development of GPS surveying techniques, Navigation with GPS, Applications of GPS

Applications: Land use and Land cover, Watershed management for sustainable development, Agriculture, Forestry, Geology, Geomorphology, Urban Applications, Hydrology

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Chang, K. T. (2006). Introduction to Geographic Information Systems. The McGraw-Hill.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
4. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
5. Parkinson,B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications (Volume-I). AIAA, USA

REFERENCE BOOKS:

1. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
2. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt.Ltd, 2013.
3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prentice hall, New Jersey
4. Paul Wolf, Elements of Photogrammetry, McGraw Hill.
5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Interscience
6. Burrough, P. P. &McDonnel, R. A. (1998). Principles of GIS. Oxford University Press.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	2	-	-	-	-	2	-	-	-	-	-	-	-
CO2	3	2	-	2	3	-	-	-	3	-	3	-	3	-	-	3
CO3	3	2	-	2	3	-	-	-	2	-	3	-	3	-	-	3
CO4	3	2	-	-	3	-	-	-	3	-	1	-	3	-	-	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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DESIGN OF CONCRETE STRUCTURES
III B.Tech – I Semester (Code : 18CE503)

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives: The student will study and understand

- Objectives of structural design, strength and serviceability concepts, and design singly reinforced beams usingWSM and LSM.
- Shear effect and design for shear in beam, calculation of development length and complete design of beam usingLSM.
- Design of one-way slab, Two-way slab and dog-legged stair case by applyingLSM.
- Design of short and slender columns for axial, uniaxial and biaxial bendingusing LSM.
- Design of isolated and combined footings usingLSM.

Course Outcomes: Students will be able to

CO1 Apply the design philosophies for beams in flexure.
CO2 Understand the behaviour and design aspects of rectangular beams.
CO3 Analyze and design slabs and dog-legged staircases using the limit state method.
CO4 Analyze and design columns, applying the Limit State Method (LSM) with the aid of IS SP 16 charts for design.
CO5 Analyze and design of isolated footings.

** IS 456-2000 and IS SP-16 Charts are to be referred*

UNIT I

Introduction to Design of Beams

Objective of structural design, Type of Loads on RCC Structures and Load combinations, Code of practices and Specifications, Design philosophies

Analysis and Design of Singly reinforced Rectangular beams by working stress method, AnalysisandDesignofsinglyanddoublyreinforcedrectangularbeamsbyLimitStateMethod.

UNIT II

Design of Beams

Design of Flanged beams for Flexure, Behavior of RC members in Shear, Torsion,BondandAnchorage, Check for development length by limit state method, Design of rectangular beam.

UNIT III

Design of Slabs and Staircase

Analysis and design of one-way simply supported slab, Design and Detailing of Two-way slabs, Design of Dog-legged Staircase.

UNIT IV

Design of Columns

Types of columns, Axially Loaded columns, Design of short Rectangular Square and circular columns, Design of Slender columns, Design for Uniaxial and Biaxial bending using SP16 charts.

UNIT V

Design of Footings

Types of footings, foundations based on soil properties, Design of axially and eccentrically loaded footings.

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TEXT BOOKS:

1. Limit State Design of Reinforced Concrete by P. C. Varghese, Prentice Hall of India.
2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros.,Roorkee
3. For Working Stress Method: Reinforced concrete by H. J. Shah, charotarpublishinghouse
4. Reinforced Concrete Structures by N. Subramanian, Oxford University Press.

REFERENCE BOOKS:

1. Reinforced concrete design by Pillai and Menon, Tata McGraw-Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah;
Pune VidyarthiGrihaPrakashan,Pune.
3. Reinforced concrete design: Principles and Practice by N. Krishna Raju., R. N. Pranesh, New Age International Publishers.
4. Reinforced Concrete Structure by R. Park., T. Paulay, Wiley India Publishers

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	1	2	-	-	1	-	-	-	-	-	1	1	2	-	-
CO2	2	1	3	-	-	1	-	-	-	-	-	1	2	1	-	1
CO3	2	1	3	-	-	1	-	-	-	-	-	1	2	1	-	1
CO4	2	1	3	-	-	1	-	-	-	-	-	1	2	1	-	1
CO5	2	1	3	-	-	1	-	-	-	-	-	1	2	1	-	1

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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DESIGN OF STEEL STRUCTURES
III B.Tech – I Semester (Code :18CE504)

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

(Using Limit State Method)

Course Objective:

- To understand the behavior and design of simple connections.
- To design Tension and compression members efficiently and economically.
- To design column bases along with connections.
- To design beams efficiently and economically.
- To understand the behavior and design of eccentric connections.

Course Outcomes:

CO1 Understand the design philosophies and classify the different connections.
CO2 Understand the behaviour and design aspects of tension and compression members.
CO3 Understand the behaviour and design aspects of different column bases.
CO4 Apply the design principles to laterally supported beams and unsupported beams.
CO5 Clasify different eccentric connections in steel structures along with their suitability.

UNIT – I

1.Introduction

Types of steels; Constructional steels; Mechanical properties; Design concepts; Fatigue behavior; Brittle fracture; Corrosion; Hot rolled sections;

2. Simple Connections

Advantages of welding; Welds; Types of welded joints; Weld specifications; Allowable stresses;Bolts; Black bolts; Failure modes of a joint; Pitch requirements of bolts; Allowable stresses;Efficiency of joint; High strength bolts; Lap andbutt joints, Truss joint connections;

UNIT – II

3. Tension Members

Introduction; Types of sections; Net area; Net effective area for angles and Tees; Design oftension members;

4. Compression Members

Introduction; Angle Struts; Effective length of a column; Allowable stresses; Types of sections;Built-up columns(using welding); Column splice (using welding)

UNIT – III

5. Column Bases

Slab base; Gusseted base; Eccentric bases;

UNIT – IV

6. Beams

Introduction; Laterally supported beams; Built-up beams (using welding); lateral buckling ofbeams; Design of laterally supported beams; Secondary design considerations; Grillagebeams;
Design of laterally unsupported beams;

UNIT – V

7. Eccentric Connections

Simple beam end connections – Seat connections; Bracket connections;

TEXT BOOKS

1. Limit state design of steel structures by S.K.Duggal, Tata McGrawhill,Publishing company Ltd.
2. Design of Steel structures by N.Subramanian, Oxford University press,2009
3. Limit state design of steel structures by Ramachandra, VeerendraGehlot, Scientific Publications.
4. Design of Steel Structures by Limit state method as per IS800-2007 by K.S. Sairam, Pearson

Education India

REFERENCE BOOKS

1. Design of Steel Structures by Limit state method as per IS800-2007 by S.S.Bhavakatti, IKInternational Publishing Housing Pvt.Ltd.
2. Analysis and Design Practice of Steel Structures by Karuna Moy Ghosh, Prentice Hall of India Publishers.
3. Structural steel design by M.L.Gambhir , Tata McGraw-Hill Education

Codes

1. IS 800-2007

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	1	-	-	1	-	-	-	-	-	-	1	2	-	-
CO2	2	2	3	-	-	1	-	-	-	-	-	-	2	3	-	-
CO3	2	2	3	-	-	1	-	-	-	-	-	-	2	3	-	-
CO4	2	3	3	-	-	1	-	-	-	-	-	-	2	3	-	-
CO5	2	3	3	-	-	1	-	-	-	-	-	-	2	2	-	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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WATER RESOURCES ENGINEERING
III B.Tech – I Semester (Code: 18CE505)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Prerequisites: Fluid Mechanics [18CE305] & Hydraulics & Hydraulic Machines [18CE404]

Course Objectives:

- To explain components of hydrology and use of hydrographs in measuring rainfall & runoff
- To determine various parameters in ground water hydrology and design of channels
- To explain design of lined canal, water logging and canal regulation works
- To explain various methods and requirements of irrigation water

Course Outcomes: Student will be able to

CO1 Interpretation of components of hydrological cycle and application of hydrographs.

CO2 Demonstrate various parameters of ground water and design of irrigation channels.

CO3 Apply the various concepts of canal lining and Canal regulation works.

CO4 Differentiate various types and methods of Irrigation and determine various water requirements of crops

UNIT – I

1. Hydrology

Hydrologic cycle; Precipitation types; Rain gauges; Computation of average rain fall over a basin; factors affecting evaporation, infiltration and run off; Computation of runoff.

2. Hydrographs

Hydrograph analysis; Unit hydrograph; Application of Unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; Application of Unit hydrograph to construction of a flood hydrograph resulting from two or more periods of rainfall; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration by superposition method and S-curve method.

UNIT – II

3. Ground Water – Well Irrigation

Introduction; Aquifer; Aquiclude; Aquifuge; Specific yield; Specific retention; Divisions of sub– surface water; Water table; Types of aquifers; Well hydraulics; Steady radial flow to a well–Dupuit's theory for confined and unconfined aquifers; Yield of an open well– Constant level pumping test, Recuperation test.

4. Channels – Silt Theories & Design Procedure

Cross section of a channel; Balancing depth; Silt theories–Kennedy's theory, Lacey's regime theory; Kennedy's method of channel design; Lacey's theory applied to channel design.

UNIT – III

5. Water logging&Canal Lining

Effects of water logging; Causes of water logging; Remedial measures; Lining of irrigation channels – necessity, advantages and disadvantages; Design of lined canal.

6. Canal outlets and regulation works

Types of outlets; Canal falls - necessity and location of falls, classification of falls; Types of regulators and functions of cross and head regulators.

UNIT – IV

7. Introduction to Irrigation: Types and Methods of irrigation, Benefits of irrigation; Ill-effects of irrigation;

8. Water Requirement of Crops: Functions of irrigation water; Classes and availability of soil water; Saturation capacity; Field capacity; Wilting point; Available moisture and readily available moisture; Moisture equivalent; Soil moisture deficiency; Limiting soil moisture conditions; Depth and frequency of irrigation; Duty and Delta; Base period; Relation between Duty and Delta; Factors affecting duty; Methods of improving duty; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; kor depth and kor period; Determination of irrigation requirements of crops; crop rotation.

TEXT BOOKS:

1. Irrigation and water power Engineering by Dr. B.C. Punmia & Dr. Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS:

1. Irrigation, Water Resources & Water Power Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, New Delhi.
3. Engineering Hydrology by K. Subramanya, TMH Publishers.
4. Engineering Hydrology by P. Jayarami Reddy, Laxmi Publications.
5. Irrigation Engineering and Hydraulic Structures by S.R. SahasraBudhe; Katson Publishing House, Ludhiana.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	1	2	-	-	1	-	-	-	-	-	-	3	2	-	1
CO2	3	1	2	-	-	1	-	-	-	-	-	-	3	2	-	1
CO3	3	2	1	-	-	1	-	-	-	-	-	-	3	2	-	1
CO4	3	2	1	-	-	1	-	-	-	-	-	-	3	2	-	1

BAPATLA ENGINEERING COLLEGE: : BAPATLA
(Autonomous)
SOIL MECHANICS
III B.Tech – I Semester (Code:18CE506)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To enable the student to understand the concept of soil formation, determine index properties of soils and identify the type of soils.
- To enable the student to understand the concept of soil structure and various soil classification systems, various laboratory and field tests to determine coefficient of permeability
- To impart the concept of seepage of water through soils and effective stress principle, determine discharge of water through soils, principles and methods of compaction.
- To enable the student to understand the principles of consolidation, determine magnitude
  and rate of consolidation settlement, the concept of shear strength of soils, determine shear parameters and shear strength of soil using various laboratory tests.

Course Outcomes: Student will be able to

CO1 Understand the concept of soil formation, identify various types of soils using index properties of soil.
CO2 Apply the concept of soil structure and various soil classification systems, various methods to determine coefficient of permeability.
CO3 Apply the principle of effective stress and principle of compaction to determine discharge of water through soils and degree of compaction in the field.
CO4 Evaluate consolidation settlement of soils and shear strength parameters using various laboratory tests.

UNIT – 1

1. Introduction
Soil formation and soil types; Regional soil deposits of India
2. Basic Definitions and Relations
Phase diagrams; Simple definitions; some important relationships;
Index Properties; Grain size distribution; Atterberg Limits; Significance of other Soil Aggregate properties

UNIT – II

3. Soil Classification
Clay Mineralogy: Introduction to soil classification; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system
4. Permeability
Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and Variable head methods, indirect methods, Factors affecting permeability;

Permeability of stratified soil deposits;

UNIT – III

5. Seepage through Soils

Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition

6. Compaction of Soils

Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behavior of Compacted cohesive soils; Compaction in the field; Compaction specifications and field control.

UNIT – IV

7. Compressibility of Soil and Consolidation

Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of Settlement; extrapolation of field consolidation curve; Settlement analysis.

8. Shear Strength of Soils

Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers

2. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.

3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications

4. A Text book of Soil Mechanics and Foundation Engineering – K.R.Arora, Standard Publishers
&Distributors, New Delhi

5. A Text book of Soil Mechanics and Foundation Engineering – P.Purushotthama Raj, Pearson
Education

6 . Introduction to Soil Mechanics- Braja M Das

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	1	-	-	1	1	2	2	3	3	2	2	2	2	1	3
CO2	3	2	3	2	2	2	3	3	2	3	2	2	2	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3	2	2	2	3	2	3
CO4	2	3	3	3	3	3	3	3	3	3	2	2	2	3	2	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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GEOGRAPHICAL INFORMATION SYSTEM LABORATORY
III B.Tech – I Semester (Code:18CEL51)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Laboratory Objectives:

- Understand the process of Digitization of maps
- creation of various features thematically
- Develop the DEM
- Learn external data linkages to internal features
- Learn GIS analysis.
- Learn GIS data base quarries

Course Outcomes:

CO1 Knowledge Acquisition: Understand the basics of digitization, thematic mapping, and GIS tools for geospatial data handling.
CO2 Application Proficiency: Apply GIS techniques to create Digital Elevation Models, link external databases, and perform spatial analysis.
CO3 Spatial Interpretation: Analyze complex spatial patterns, interpret maps, and query geospatial data effectively.
CO4 Data Transformation Mastery: Demonstrate expertise in vector-to-raster and raster-to-vector conversions, showcasing advanced geospatial data manipulation skills.

List of Experiments:

1. Digitization of Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Developing Digital Elevation Model (DEM)
5. Linking external data base (.CSV, or. EXCEL, or .Txt) to internal features
6. Buffers creation around (Point, line, and polygon) Features
7. Create point features using excel data
8. Querying on attribute data
9. Overlay Operations (Identity, or Intersect or Union or erase)any two
10. Vector to raster creation (Features conversion, Point, polyline and polygon)
11. Raster to vector conversion (Line or polygon options)
12. Preparation of Flow Accumulation, Flow direction maps (using DEM)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	-	-	2	3	-	-	-	-	-	3	-	-	-	2	3
CO2	3	-	-	2	3	-	-	-	-	-	3	-	-	-	2	3
CO3	3	-	-	2	3	-	-	-	-	-	3	-	-	-	2	3
CO4	3	-	-	2	3	-	-	-	-	-	3	-	-	-	2	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA

(Autonomous)

SOFT SKILLS LABORATORY

III B.Tech – I Semester (Code:18CEL52)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives

The course aims

- To make the engineering students aware of the importance, the role and the content of softskills through instruction, knowledge acquisition, demonstration and practice.
- To know the importance of interpersonal and intrapersonal skills in an employability setting
- Actively participate in group discussions / interviews and prepare & deliver presentations
- Function effectively in multi-disciplinary and heterogeneous teams through the knowledgeof team work, Inter-personal relationships, stress management and leadership quality

Course Outcomes

By the end of the course the students would be able to

CO1 Use appropriate body language in social and professional contexts
CO2 Demonstrate different strategies in presenting themselves in professional contexts
CO3 Analyze and develop their own strategies of facing the interviews successfully
CO4 Develop team coordinating skills as well leadership qualities

UNIT-I

1. Body Language & Identity Management

a. Facial Expressions – Kinesics - Occulesics
b. Haptics - Proxemics
c. Para Linguistics
d. Appearance
e. Identity Management Communication

2. Emotional Intelligence & Life Skills

a. Self Awareness through Johari Window and SWOC analysis
b. Self Motivation
c. Empathy
d. Assertiveness & Managing Stress
e. Positive Attitude
f. Time Management
g. Goal Setting: Short term, Long Term, Vision, Mission.

3.Business Presentations

a. Preparing effective Presentations Power Point Presentations
b. Power Point Presentations
c. Using Visual Aids
d. Mock Presentations

4.Employability Skills

a. Group Discussion
b. Team Building and Leadership Qualities
c. Interview Skills

Reference Books:

1. Personality Development and Soft skills (Second Edition), Barun K. Mithra. Oxford University Press: 2016
2. The Definitive Book of Body Language, Allan & Barbara. Pease International:2004
3. Working with Emotional Intelligence, Daniel Goleman. Bloomsbury:1998
4. English for Jobseekers, Lina Mukhopadhyay. Cambridge University Press:2013
5. The 7 Habits of Highly Effective People, Stephen R.Covey. St. Martin's Press:2014

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	-	-	2	3	3	2	2	-	-	2	-
CO2	-	-	-	-	-	-	-	2	3	3	2	2	-	-	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	2	-	-	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	2	-	-	2	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)
ESTIMATION & QUANTITY SURVEYING
III B.Tech – II Semester (Code:18CE601)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Pre-requisite: Building Planning and Drawing

Course Objectives:

- To Estimate the various types of Buildings.
- To Prepare the Detailed Estimation for RCC, Road.
- To Construct the Specifications for a Building and Evaluate the Rate per unit item of different works.
- To discuss the PWD accounts and Procedures of works.

Course Outcomes: At the end of the course student will be able to

CO1 Acquire the knowledge of the drawings, procedures and different estimating methods of Buildings.
CO2 Acquire the knowledge of Estimate the Quantities of RCC, Road Works.
CO3 Recognize and Realise the importance of specifications and Estimate the unit Rate for different Engineering Works.
CO4 To Gain the Knowledge on PWD accounts and Procedures of works and Tendering Process.

UNIT – I

1. Procedure of Estimation
Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

2. Methods of building estimates
Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

3. Estimate of Buildings
Estimate of residential building; Estimate of a building from line plan.

UNIT – II

4. Estimate of RCC works
Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC column with foundation.

5. Road Estimating
Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.

UNIT – III

7. Specifications
Purpose and method of writing specifications; General specifications. Detailed Specifications for
Brick work; R.C.C; Plastering; Mosaic Flooring, R.R.Stone Masonry.

8. Analysis of Rates
Task or out – turn work; Labour and materials required for different works; Rates of materials And labour; Preparing analysis of rates for the following items of work:
i) Concrete ii) RCC Works iii) Brick work in foundation and super structure
iv) Plastering v) CC flooring vi) White washing.

UNIT – IV

9. PWD Accounts and Procedure of Works
Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

10. Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, pre bid qualification. General and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes. Arbitration.

11. Miscellaneous:
Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard
rent; Mortgage, brief outlines of valuation process.

TEXT BOOKS

1. Estimating & Costing in Civil Engineering by B.N. Dutta; U. B. S. Publishers & Distributors,
New Delhi.
2. Valuation of Real properties by S. C. Rangwala; Charotar Publishing House, Anand
3. FIDIC Contract Conditions.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	-	-	-	-	-	2	3	3	-	2	-	-	2	-
CO2	3	3	-	-	-	-	-	2	3	3	-	2	-	-	2	-
CO3	3	2	-	-	-	2	2	2	3	3	-	2	-	-	2	-
CO4	-	2	-	-	-	-	-	3	2	3	-	2	-	-	2	-

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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IRRIGATION STRUCTURES
III B.Tech – II Semester (Code: 18CE602)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Prerequisites: Fluid Mechanics [18CE305]
Hydraulics & Hydraulic Machines [18CE404]
Water Resources Engineering [18CE505]

Course Objectives:

- To study various methods measurement of water and Reservoir planning
- To design a Gravity dam
- To understand various types of earth dams and spillways
- To describe various types of cross drainage works and head works

Course Outcomes: Student will be able to

CO1 Interpretation of stream gauging techniques and planning of reservoir.
CO2 Determination of stability of the gravity dam using various methods.
CO3 Interpretation of various types of earth dams and spillways.
CO4 Interpretation of various types of cross drainage works and diversion head works.

UNIT – I

1.Stream gauging - Discharge measurement- Area-Velocity method; Slope Area method; Measurement of velocity- Surface floats, Sub–surface float, Velocity rod; Pitot tube; Current meter. Stream depth measurements.

2. Reservoir Planning: Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; flood routing.

UNIT – II

3. Dams in General: Introduction; Classification; Physical factors governing selection of type of dam.

4.Gravity Dams - Introduction; Forces acting on a gravity dam; Modes of failure and criteria for stability requirements; Stability analysis; Elementary Profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams.

UNIT – III

5. Earth dams: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams.

6. Spillways: Introduction; Types of spillways; Energy dissipation below spillways.

UNIT – IV

7. Diversion Head Works- Component parts of a Diversion Head work; Weirs and barrages- Types of weirs; Causes of failure of weirs and their remedies; Design of weirs on permeable foundations –Bligh's creep theory.

8. **Cross Drainage Works -**Introduction; Types of cross drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts.

TEXT BOOKS:

1 Irrigation and water power engineering by Dr. B.C. Punmia & Dr. Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.
2 Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS:

1 Irrigation, Water Resources & Water Power Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.
2 Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, New Delhi
3 Irrigation Engineering and Hydraulic Structures by S.R. SahasraBudhe; Katson Publishing House, Ludhiana

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	-	-	-	1	-	-	-	-	-	-	3	2	-	1
CO2	3	2	1	-	-	1	-	-	-	-	-	-	3	2	-	1
CO3	3	1	-	-	-	1	-	-	-	-	-	-	3	2	-	1
CO4	3	2	-	-	-	1	-	-	-	-	-	-	3	2	-	1

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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FOUNDATION ENGINEERING
III B.Tech – II Semester (Code : 18CE603)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To enable the students to acquire proper knowledge about soil exploration and various principles of important field tests such as SPT, plate bearing test etc., acquire knowledge of various earth pressure theories and determination of resultant thrust acting on earth retaining walls
- To impart the students in depth knowledge about various types of slopes and methods for their stability analysis, analyzing the stress at any point below the ground surface due to self-weight and externally applied load.
- To impart the students knowledge of types of shallow foundations and theories required for determination of bearing capacity of soils, principle of consolidation, to compute immediate and consolidation settlements of shallow foundations and determining bearing capacity of soils based on settlement criteria.
- To enable the students to imbibe the concepts of pile foundations and determine their Load carrying capacity based on suitability of soils, well foundations and analysis of forces acting on caissons, acquire knowledge of expansive soils

Course Outcomes: Student will be able to

CO1 Apply the knowledge of various principles of field tests for soil exploration and various earth pressure theories for determination of resultant thrust acting on earth retaining walls.
CO2 Analyse the stability of slopes using various methods and the stress at any point below the ground surface due to both self weight and externally applied load.
CO3 Evaluate allowable bearing capacity of shallow foundations based on shear strength criteria and settlement criteria using different bearing capacity theories.
CO4 Analyse the forces acting on well foundations and problems of expansive soils and determine load carrying capacity of piles.

UNIT – I

1. Sub–Soil Investigation and Sampling

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field tests vis-à-vis Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods; Borehole logs; Site investigation report;

2. Lateral Earth Pressure & Retaining Walls

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls;

UNIT - II

3. Stability of Slopes

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes -forms of slip surface; Total stress and Effective stress methods of analysis; $\phi_u=0$ Analysis (Total Stress Analysis) ; C-ϕ Analysis- Method of slices; Location of most Critical Circle; Stability of Earth

Dam Slopes; Friction Circle Method; Taylor's Stability Number;

4. Vertical Stresses below Applied Loads

Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newark's influence chart; Approximate stress distribution methods for loaded areas; Westergaard's equation

UNIT -III

5. Bearing Capacity Of Shallow Foundation

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation. Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi's Bearing Capacity theory; kempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity;

6. Settlement Analysis

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlement –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods;

UNIT – IV

7. Pile Foundations

Introduction; Uses of Piles; Types of Piles; Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction;

8. Well Foundations

Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells;

9. Foundations In Expansive Soils

Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils

TEXT BOOKS:

1 Basic and Applied Soil Mechanics – GopalRanjan and A.S.R.Rao, New Age International
2 Publishers
3 Foundation Engineering by B. J. Kasmalkar; Pune VidyarthiGrihaPrakashan, Pune
4 Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
5 Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
6 Geotechnical Engineering by SK Gulati&ManojDatta, Tata McGraw- Hill Publishing Company Limited.
7 Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore

8 Geotechnical Engineering, - Codutu, Pearson Education

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	3	3	2	1	1	2	3	2	2	1	3	3	2	3
CO2	3	3	3	3	2	1	1	2	3	2	2	1	3	3	2	3
CO3	3	3	3	3	2	1	1	2	3	2	3	1	3	3	2	3
CO4	3	3	3	3	2	1	1	2	3	2	3	1	3	3	2	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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HIGHWAY ENGINEERING
III B.Tech – II Semester (Code:18CE604)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To discuss the principles of planning and geometric design of highways.
- To discuss the traffic flow characteristics.
- To assess the properties of highway construction materials and design the flexible and rigid pavements.
- To explain the construction and maintenance techniques used in the different pavement layers.

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Course Outcomes: Student will be able to

CO1 Understand the various design aspects of road geometric elements.

CO2 Interpret the traffic flow characteristics and traffic operations.

CO3 Select the suitability of pavement materials and determine the crust thickness of the pavement.

CO4 Analyze the causes for distresses in the pavement layers.

UNIT-I

1. Highway Network Planning and Alignment

Introduction to Transportation Systems and Different Modes of Transportation, Road Classification, Road Patterns, 20 Year Road Development plans. Current road projects in India; Highway Alignment: Requirements, factors controlling, Engineering Surveys.

2. Highway Geometric Design

Geometric Design: Highway Cross Section Elements - Friction, Unevenness, Camber, Carriageway Width, Kerbs, road margins, formation width, right of way, Sight Distance- Stopping Sight Distance, Overtaking Sight Distance, Intermediate Sight Distance, Design of Horizontal Alignment- Super elevation, transition curves, extra widening, set back distance, Design of Vertical Alignment-Grades and Grade Compensation, Types of Vertical curves and design.

UNIT-II

3. Traffic Studies

Introduction, Road User Characteristics, Vehicle Characteristics, Traffic Volume Studies, Speed Studies, Origin and Destination Studies, Traffic Flow Characteristics, TrafficCapacity and Level of Service.

4. Design Of Traffic Control Devices

Traffic Operations-Traffic Regulation, Traffic Control Devices- Markings, Signs, Signals, Rotary Intersection.

UNIT-III

5. Pavement Materials

Pavement types and components of a pavement structure; characterization of different pavement materials including: sub-grade soil, aggregates, bitumen, modified bitumen, cutback bitumen, and emulsion; Different grading systems for bitumen; Marshall method of bituminous mix design.

6. Design of Pavements

Design of pavements- Introduction; flexible pavements, factors affecting design and performance; design of flexible pavements as per IRC-37; rigid pavement components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC-58.

UNIT-IV

7. Highway Construction and Maintenance

Construction Steps of Embankment, Sub Grade, Granular Sub Base (GSB), Wet Mix Macadam (WMM), Dense Bituminous Macadam (DBM), Bituminous Concrete (BC), Dry Lean Concrete (DLC), Pavement QualityConcrete (PQC), failures in flexible pavement, failures in rigid pavements, maintenance of Bituminous pavements and concrete pavements.

TEXT BOOKS

1. Khanna, S. K., C. E. G. Justo, A.Veeraragavan"Text book on Highway Engineering." Nem Chand Bros, Roorkee (2014).10thEdition.
2. Principles and practices of Highway Engineering (2013), L R Kadiyali; N B Lal,Khanna Publishers, NaiSarak, Delhi

REFERENCE BOOKS

1. Principles of Transportation Engineering by ParthaChakroborthy&Animesh Das; Prentice Hall ofIndia, New Delhi.
2. Ministry of Road Transport and Highways- Specifications for Roads and Bridge Works, Fifth Revision, IRC, New Delhi, India-2013
3. IRC 37:2018- Guidelines For The Design of Flexible Pavements(Third Revision)
4. IRC58-2015 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways

NPTEL :

http://nptel.ac.in/courses/105101087/
http://nptel.ac.in/courses/105105107/

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	3	2	2	-	-	-	-	-	-	-	2	3	-	3
CO2	2	3	3	3	3	2	-	-	-	-	-	-	3	3	-	3
CO3	2	3	2	3	3	2	-	-	-	-	-	-	2	3	-	3
CO4	-	3	2	3	3	2	-	-	-	-	-	-	2	3	-	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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Elective - I

ADVANCED STRUCTURAL ANALYSIS
III B.Tech – II Semester (Code : 18CED11)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To understand the analysis of indeterminate structures using strain energy concept
- To understand the plastic behavior of beams and rigid jointed frames. .
- To analyze the multi-storey frames by approximate methods and analysis of indeterminatestructures by kani'sMethod.
- To study the analysis of continues beams using matrix approach

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

CO1 Analyze the indeterminate structures by strain Energy method.
CO2 Apply plastic analysis principles to Indeterminate beams and portal frames.
CO3 Apply Approximate method for analysis of multistoried frames and Analyze the indeterminate beams and Frames by Kani's Method.
CO4 Analyze the indeterminate beams by Stiffness matrix method and Flexibility matrix method.

UNIT-I

1. **Strain Energy Method:** Strain energy method for analysis of continuous beams and rigid joined plane frames (DOF: 2) and two hinged arches up to single degree redundancy. (Castigliano's theorem-II).

2. **Redundant Pin Jointed Frames:** Analysis of pin jointed frames (one degree redundancy); Forces in indeterminate pin jointed frames due to temperature variation and lack of fit;

UNIT-II

3. Plastic Behavior of Structures
Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of memberscarrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of fullyplasticmoment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapseload analysis of indeterminate beams and single bay, single storied portal frames.

UNIT – III

4. Multi Storey Frames (Approximate Methods) Substitute frame method for gravity loads; Portal method and cantilever method for lateral loads.

5. **Kani's Method** Principles of the method; Application to continuous beams and portal frames (single bay, single storey with vertical legs only) without and with side-sway.

UNIT – IV

6. Introduction to Matrix Methods

Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix.

7. Analysis of Continues beams

Analysis of continuous beams by Flexibility method and stiffness matrix method, (up to 2 DOF).

TEXT BOOKS :

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1. V. N. Vazirani& M. M. Ratwani ,Structural Analysis, Vol. II , KhannaPublishers,Delhi.
2. Structural Analysis – A matrix approach by G. S. Pandit& S. P. Gupta; Tata Mc. Graw – Hill Publishing Co. Ltd., New Delhi.
3. Limit Analysis of Structures by Manicka&Selvam , DhanpatRai Publications,2012.

REFERENCES:

1.Matrix analysis of framed structures by Weaver &Ger
2.Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	3	1	-	-	1	-	-	-	-	-	-	3	1	-	-
CO2	2	3	2	-	-	1	-	-	-	-	-	-	2	3	-	-
CO3	2	3	1	-	-	1	-	-	-	-	-	-	2	3	-	-
CO4	3	3	1	-	-	1	-	-	-	-	-	-	3	2	-	-

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - I

INSTRUMENTATION AND SENSOR TECHNOLOGY IN CIVIL ENGINEERING
III B.Tech – II Semester (Code:18CED12)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To introduce the basics of measurements. To elucidate sensors and signal conditioning circuits.
- To introduce different error analysis methods. To familiarize with different sensors and transducers &To explain signal conditioning circuits.
- To understand concepts of acquiring the data from transducers/input devices, their interfacing and instrumentation system design.
- To familiarize with different data transfer techniques.

Course Outcomes:

After the completion of the course student will be able to:

CO1 Illustrate the different methods for the measurement of length and angle
CO2 Elucidate construction & working of various industrial devices used to measure pressure, sound & flow
CO3 Explicate the construction and working of various industrial devices used to measure temperature, level, vibration, viscosity and humidity
CO4 To analyse, formulate and select suitable sensor for the given industrial applications & summarize different methods for level measurement

UNIT – I

Introduction: Basic definitions related to measurements/ Instrumentation, Block diagram of generalized measurement / Instrumentation system.
Static characteristics of instruments: Introduction, static characteristics: accuracy, precision, resolution, static sensitivity, Linearity, Threshold, Hysteresis, Dead Zone, span, Range Loading effect.
Dynamic characteristics: Generalised Mathematical model of measurement system,operational & sinusoidal transfer functions zero, first and second order instruments & their response o step, ramp, and impulse inputs.

UNIT – II

Errors in Measurements: Static error, Types of errors, estimation of static errors: limiting errors &their combinations, error estimates from the normal distribution, probable errors & their combinations statistical analysis of measurement data uncertainty analysis curve fitting: Method ofleast squares.

Introduction: Definition of Transducer, Classification of transducers.
Resistive Transducers: Potentiometers, strain gauges & their types, RTD's, thermistors, Hot wire anemometers.

Inductive Transducers: Transducers type, electromagnetic type, Magneto strictive type, Variable reluctance type, (or) Variable permeability type.
Capacitive Transducers: Variable dielectric, Variable gap, Variable area type Capacitive devices, Differential type.

UNIT – III

Piezo-electric Transducers: Piezo-electric effect, Piezo-electric Materials, Piezo-electric transducer &its characteristics.
Radiation Transducers: Radiation Pyrometry, Radiation fundamentals Radiation Pyrometer, Total radiation pyrometer, selective radiation pyrometer, Two-color radiation pyrometers.

UNIT-IV

Signal and System Analysis: Introduction, Analog Filters and frequency analysers, Frequency analysis for various input signals, digital frequency analysers, system analysis by Harmonic testing, system analysis by Transient testing

Condition Monitoring and Signature Analysis Applications: Introduction, Vibration and Noise Monitoring, Temperature Monitoring, Wear Behaviour Monitoring, Corrosion Monitoring, Performance Trend Monitoring, Selection of Condition Monitoring Techniques.

TEXT BOOKS:

1. BC Nakra & KKChaudhry, Instrumentation, Measurement and Analysis 2nd Edition, TMH
2. AK Ghosh, Introduction to Instrumentation and Control (PHI)

REFERENCE BOOKS:

1. Allan s Morris, Principles of Measurement systems (PHI)
2. A.K.Sawheny, Electrical & Electronic Measurements and Instrumentation DhanpathRai
3. JB Guptha, Electrical & Electronic Measurements and Instrumentation, S.K.Kataria
4. E.O.Doeblin, Measurement systems: Applications and Design, TMH
5. D.V.S Murthy, Transducers & Instrumentation, PHI
6. D.S.Kumar, Mechanical Measurements, Metro Politan

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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Elective - I

SUSTAINABLE ENGINEERING & TECHNOLOGY
III B.Tech – II Semester (Code : 18CED13)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To develop an awareness on issues in areas of sustainability.
- To establish the role and impact of engineering activities and engineering decisions on environmental, societal, and economic well-being.
- To give familiarity with the methods and tools used for sustainable product-service system development
- To understand the role of engineering and technology within sustainable development.

Course Outcomes:

At the end of the course, the student will be able to,

CO1 Increased awareness on issues in the area of sustainability

CO2 Gain an understanding of the role and impact of engineering activities and engineering decisions on the environment, society, and economics

CO3 Gain familiarity with the methods and tools employed for sustainable product-service system development.

CO4 Understand the role of engineering and technology within sustainable development.

UNIT-I

1.Anintroduction to sustainability -Introduction -The Magnitude of the Sustainability Challenge Energy

2. Materials Use- Minerals, Metals, and Organics Water -

3.Environmental Emissions - Ozone Depletion in the Stratosphere- Global Warming-Regional and Local Air Quality -Summary of Air Quality - Water Quality - Wastes

UNIT-II

4. Risk and life-cycle frameworks for sustainability - Introduction- Risk -Definitions- Risk Assessment -Risk-Based Environmental Law

5.Life-Cycle Frameworks- Defining Life Cycles- Life-Cycle Assessment- Life-Cycle-Based Environmental Law;

6. Life-Cycle Assessment Tools- Process-Based Life-Cycle Assessments Input-Output LCA - Hybrid Approaches

UNIT-III

7. Green, sustainable materials- Introduction- Environmental and Natural Resource Use Footprints of Material Extraction and Refining Tracking Material Flows in Engineered Systems

8.Introduction - Sustainable Engineering Design Principle; Economic Performance Indicators-Definitions -Estimates of Environmental Costs- A Framework for Evaluating Environmental Costs; Environmental Performance Indicators- Life-Cycle Impact Assessment

UNIT-IV

9.CASE STUDIES -Introduction; Biofuels for Transportation-The Carbon Cycle and Biofuels-Feedstocks for Biofuels - Processing Routes for Biomass to Biofuels- Biofuel Life Cycles-Cautionary Tales and Biofuels- Summary of Sustainability of Biofuels

10.Sustainable Built Environments- Energy Consumed for Building Operation, Materials Use for Building Construction and Maintenance, Design of Buildings for Sustainability, Conclusions on Sustainability of Buildings

TEXT BOOK:

1. Sustainable engineering Concepts, Design, and Case Studies by DAVID T. ALLENDAVID R. SHONNARD

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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Elective - I

ADVANCED FLUID MECHANICS
III B.Tech – II Semester (Code : 18CED14)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives: The main objectives of this course are to

- To undertake sustained learning in fluid mechanics to advance their knowledge in this field.
- To enhance the understanding of fluid mechanics, including the equations of motion in differential form and turbulence.
- To understand an idea about stilling basin types.
- To understand hydraulic mechanics.

Course Outcomes: The students will be able to

CO1 Recognize the particular flow regime present in typical engineering system.
CO2 Demonstrate the concept of stream function and potential function.
CO3 Choose the appropriate fluid mechanics principles needed to analyze the fluid-flow situations.
CO4 To identify the types of stilling basins.

UNIT – I

1. **Basic Concepts and Fundamentals:** Fluid statics, Cartesian tensors, fluid kinematics, description of fluid motion, types of motion of fluid elements, vorticity and circulation, equation of motion of forced and free vortex flow.

2. **Stream function and velocity potential function:** stream function and its relation with velocity field, relation between stream lines and lines of constant potential, Lagrangian and Eulerian approaches, Reynold's transport theorem.

UNIT – II

3. **Potential flow:**Uniform flow, sink flow, source flow, plane source in a uniform flow, source and sink pair in a uniform flow, pressure distribution on the surface of cylinder. Potential flow between two parallel plates.

4. **Incompressible viscous flow:** Concept of laminar and turbulent flows, derivation of Hazen poissuille's equation for velocity and discharge through a pipe, derivation for friction factor for laminar flow, Navierstokes's equation and its significance.

UNIT – III

5. **Turbulent flow:** Introduction of turbulent flow, governing equation of turbulent flow, fully developed turbulent pipe flow for moderate Reynold's number, Prandtl's mixing length theory, turbulence modeling.

6. **Introduction to Computation of Fluid Dynamics (CFD):**Boundary conditions, basic discretization – Finite difference method, Finite volume method and Finite element method.

UNIT – IV

7. **Channel Transition:** Reduction in width of the channels, hump, surge in open channel, significance of jump, Indian type of stilling basins and USBR stilling basins.

8. **Reciprocating Pump:** Introduction, main components, slip, working producer, classification, indicator diagram, maximum speed of reciprocating pump.

TEXT BOOKS

1. Bansal R. K., A Text Book of Fluid Mechanics and Machines, Laxmi Publications, 2010.
2. Douglas J. F., Fluid Mechanics, Pearson Education, 2005.
3. Kumar D. S., Fluid Mechanics and Fluid Power Engineering, S. K. Kataria& Sons, 1987.
4. Muralidhar K., G. Biswas, Advanced Engineering Fluid Mechanics, Alpha Science International limited, 2005.
5. Rama D. D., Fluid Mechanics and Machines, New Age International, 2009.

REFERENCE BOOKS

1. Schlichting H., K. Gersten , Boundary Layer Theory, 8/e, Springer 2000.
2. Shames I. H., Mechanics of Fluids, 4/e, McGraw-Hill, 2002.
3. Streeter V. L. and E. B. Wylie, Fluid Mechanics, McGraw-Hill, 1979.

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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Elective - II

ADVANCED DESIGN OF STRUCTURES
III B.Tech – II Semester (Code : 18CED21)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives: The student will study and understand:

- Stability requirements and design of cantilever type retaining wall and design of pile foundation
- Design of raft foundation and elevated water tank.
- Design of Gantry Girder and its connections using LSM
- Design of plate girder
- Understand and design of roof truss and purlins

Course Outcomes: Students will be able to

CO1	Understand the design aspects of retaining wall and pile foundation as per IS code.
CO2	Understand the design aspects of raft foundation and rectangular water tank.
CO3	Identify the different loads on gantry girder and its design principles.
CO4	Apply the design concepts to plate girder under moving loads.
CO5	Understand the wind loads on structures with emphasis to roof trusses.

UNIT I

Retaining Walls and Pile Foundations: Types of Retaining walls, Forces on retaining walls, Stability requirements, Design and detailing of Cantilever type retaining wall.

Introduction to Pile foundation, Design of Pile and Pile cap.

UNIT II

Design of Raft Foundation: Introduction to Raft foundation, Design of raft Foundation.

Design of Rectangular Water Tank: Introduction, Design of Rectangular Elevated Water Tank.

UNIT III

Gantry Girder: Introduction; Loads on Gantry girders; Fatigue effects; Design of gantry girder;

UNIT IV

Plate Girder: Introduction, Design of flanges and web, stiffeners and their connections

UNIT V

ROOF TRUSSES: Type of trusses for different spans; Components of a roof trusses; Live loads and wind loads

on trusses as per I.S Codes; Design of Purlins including tubular sections.

TEXT BOOKS:

1. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishing house
2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros., Roorkee.
3. Limit state design of steel structures by S.K.Duggal, Tata McGrawhill,Publishing company Ltd.
4. Design of Steel structures by N.Subramanian, Oxford University press,2009

REFERENCE BOOKS:

1. Reinforced concrete design by Pillai and Menon, Tata McGraw-Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah;
3. Pune Vidyarthi Griha Prakashan, Pune.
4. Design of reinforced concrete structures by S. Ramamrutham; DhanpatRai&Sons.
5. Design of Steel Structures by Limit state method as per IS800-2007 by S.S.Bhavakatti, IKInternational Publishing Housing Pvt.Ltd.
6. Design of Steel Structures by Limit state method as per IS800-2007 by K.LSairam, Pearson Education India
7. Structural steel design by M.L.Gambhir , Tata McGraw-Hill Education

Code Books:

1. IS 456-2000, IS 3370 (Part-II and Part-IV),
2. IS 800-2007, IS 875 Part-III

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	2	3	-	-	1	-	-	-	-	-	-	2	3	-	-
CO2	2	2	3	-	-	1	-	-	-	-	-	-	2	3	-	-
CO3	2	2	3	-	-	1	-	-	-	-	-	-	2	3	-	-
CO4	2	2	3	-	-	1	-	-	-	-	-	-	2	3	-	-
CO5	2	2	3	-	-	1	-	-	-	-	-	-	2	3	-	-

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Elective - II

OFFSHORE ENGINEERING
III B.Tech – II Semester (Code : 18CED22)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives: To enable the students to

- Learn the concepts of petroleum site exploration, analysis of offshore structure
- Understand the offshore soil mechanics.

Course Outcome:

CO1 Students will learn the basics of offshore operations.
CO2 They will learn the Laboratory testing methods, In situ testing methods and geophysical methods and able to design the offshore structures.

UNIT I

Introduction to offshore oil and gas operations. Sea States and Weather, Offshore Fixed and mobile Units, Offshore Drilling, Difference in drilling from land, from fixed platform, jack up, ships and semi submersibles. Offshore Well Completion, Offshore Production systems, Deep-water technology, Divers and Safety, Offshore Environment, classification & properties of marine sediments. Consolidation and shear strength characteristics of marine sediments. Planning and site exploration.

UNIT II

Drilling. Sampling techniques. Laboratory testing, In situ testing methods and geophysical methods. Current design practices of pile supported and gravity offshore structures.

UNIT III

Dynamic analysis of offshore structures. Centrifugal modelling. Anchor design. Break out resistance analysis and geotechnical aspects of offshore pipeline and cable design. Field instrumentation and performance observation.

UNIT IV

Offshore soil mechanics; Offshore pile foundations and caissons; Design of breakwaters; Buoy design and mooring systems; Offshore drilling systems and types of platforms.

TEXT BOOKS:

1. Standard Hand Book of Petroleum & Natural Gas Engineering" – 2nd Edition 2005-William C.Lyons& Gary Gulf-Gulf professional publishing comp (Elsevier).
2. Wellsite Geological Techniques for petroleum Exploration by Sahay.B et al.

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Elective - II

DISASTER PREPAREDNESS AND PLANNING MANAGEMENT
III B.Tech – II Semester (Code : 18CED23)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

COURSE OBJECTIVES: The subject provides

- Knowledge of disaster and its classifications.
- Exposure to Institutional Framework
- Good knowledge on Prevention and Mitigation
- Explanation on Preparedness and Response and Disaster Planning

Course
Outcomes: At the end of the course student will be able to

CO1 Know the disaster and its classifications.
CO2 Understand the importance of Institutional Framework
CO3 Gain the good exposure on Prevention and Mitigation
CO4 Have knowledge on Preparedness & Response and Disaster Planning

UNIT-I

Introduction; Disaster, classification of disaster- Based on Time Duration to Occur, Based on Inducing Parameters, Natural Disasters- Volcanic Eruption, Natural Disasters Induced by Human Interventions, Exclusive Human-made Disasters.

UNIT-II

Institutional Framework - Evolution of Disaster Management in India, Disaster Management during British Administration and Post-Independence, Emergence of Institutional Arrangement in India, Organisation and Structure of Disaster Management, Disaster Management Framework, Present Structure for Disaster Management in India, Disaster Management Act, 2005 National Disaster Management Authority (NDMA), National Level Institutions, State level Institutions, District level Institutions, National Institute of Disaster Management (NIDM), National Disaster Response Force (NDRF), State Disaster Response Force (SDRF), Civil Defense, Fire Services, Home Guard, Interface between the Ministries for disaster Management,

UNIT-III

Prevention and Mitigation; Introduction, Mainstreaming of Disaster Risk Reduction in Developmental Strategy, National Disaster Mitigation Fund, Measures taken for Prevention and Mitigation of Hazards, Earthquakes, Cyclones, Floods, Study of Land Contour by GSI, Landslides, Tsunami, Droughts, Fire, Forest Fire Management, Oil Industry, Chemical

Disasters, Prevention of Disasters in Mines, Epidemics, Measures taken for Rail Safety, Road, Civil Aviation,

UNIT-IV

Preparedness and Response; Introduction, Institutional Arrangements, India Meteorological Department (IMD), Forecast of Rainfall, Forecasting System – Background, Forecasting and Warning of Cyclones, Flood Forecasting – Central Water Commission, Tsunami warning – Indian National Centre for Oceanic Information System(INCOIS), Warning about Landslide hazard – Geological Survey of India (GSI), Avalanche warning – Defense Research & Development Organization (DRDO), Disaster Management Support (DMS) – Indian Space Research Organization, Radiological and Nuclear Emergencies, Installation of Radiological Detection Equipment, Director General of Mines Safety, Epidemic, Preparedness, Role and Responsibility of Central and State Governments, Role of the State Government, Role of District Administration, Role of Sub-district Administration, National Disaster Response Force (NDRF),

Disaster Planning; Principal causes of Disaster, Some Major Effects of Disasters, Disaster Plan.

TEXT BOOKS:

1. K.Palanivel, J.Saravanavel, S.GunasekaranRobbins, Disaster Management, Allied Publishers Pvt. Ltd. 2015.
2. Manual on Disaster Management in India, Ministry of Home Affairs, Government of India, 2011.

REFERENCE BOOK:

1. Mullins, J. Laurie, Management and Organizational Behavior, Oxford Publishers, 2007.

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Elective - II

CONSTRUCTION ENGINEERING MATERIALS
III B.Tech – II Semester (Code : 18CED24)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:

The student will study and understand about

- Ferrous and non-ferrous materials.
- Ceramic materials.
- Polymeric materials.
- Paints, Enamels &Varnishes and Gypsum.
- Miscellaneous Materials and Geosynthetics, smart materials & Composite Materials

Course Outcomes:

At the end of the course, the student will be able to know,

CO1 Difference between Ferrous and non-ferrous materials which are used in construction.
CO2 Ceramic materials and its polymorphism, properties and classification.
CO3 Polymeric materials and mechanism of polymerization and its applications.
CO4 Paints, Enamels &Varnishes along its composition and characteristics.
CO5 Gypsum and its properties.
CO6 Miscellaneous Materials used in construction and about Geosynthetics, smart materials &Composite Materials.

UNIT-I

1.Introduction to ferrous metals- iron- Pig Iron - Cast Iron - wrought Iron- rolled steel sections- Reinforcing steel bars- tensile testing of steel sections - alloy steel

2. Introduction to non -ferrous metals- aluminum- copper - zinc- lead- tin- nickel

UNIT-II

3. Introduction to ceramic materials - Polymorphism in ceramic materials- Mechanical, Thermal, Electrical properties of ceramic phases- Classification of ceramics- Refractories- Glass- Commercial forms of Glasses- Glass wool

4. Introduction to polymeric materials- polymerisation Mechanism- Depolymerisation- Resins - Plastics- Constituents of Plastics- Properties of Plastics- Application of plastics- rubbers- Classification of Rubbers- Uses of Rubber

UNIT-III

5. Introduction to Paints, Enamels and Varnishes- Composition of oil paints- characteristics of oil paints- preparation of paints-pigment volume concentration- water paints -enamel paints - Varnish- french polish-wax polish- defects of painted surfaces- Texture paints

6. Introduction to Gypsum- effects of heat and Moisture on Gypsum- setting and Hardening of Gypsum- Classification of Gypsum- Manufacture of Gypsum- Plaster of Paris- Gypsum wall plasters- gypsum plaster boards- pyrocell

UNIT-IV

7. Introduction to Miscellaneous Materials- Adhesives- Asbestos- Linoleum- Thermocol- Fibres-Decorative GRC materials-- Concrete Paver Blocks - Heat , Sound, Water insulating materials

8. Introduction to Geosynthetics, smart materials. Composite Materials

TEXT BOOKS:

1.Building Materials by S.K. Duggal

2. Engineering Materials by R.K. Rajput

REFERENCES:

1. Building Materials, Construction and Planning by S.MahaboobBasha

BAPATLA ENGINEERING COLLEGE : : BAPATLA

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ADVANCED SURVEYING LABORATORY

III B.Tech – II Semester (Code : 18CEL61)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To determine distances and relative positions using trigonometric leveling
- To deal with various methods employed for the measurement of areas and volumes.
- To build the knowledge on different methods of setting & design of simple circular curves.
- To develop the concepts on usage of EDM, Digital Theodolite and total station.

Course Outcomes:

By the end of the course, the students will be able

CO1 Determine the reduced level of different structures when base is inaccessible and accessible.

CO2 Design and layout curves for a roads and railways.

CO3 Prepare contour maps for the given area.

CO4 Understand applications related to the Total station.

Experiments

1. To determine the elevation of the top of the object when the base is accessible
2. To determine the elevation of the top of the object when the base is inaccessible when the instruments are in same vertical plane.
3. To determine the elevation of the top of the object when the base is inaccessible when the instruments are in not in the same vertical plane.
4. To set Simple circular curve by using offsets from Long Chord method.
5. To set Simple circular curve by using radial, perpendicular offsets from tangents.
6. To set Simple circular curve by Rankine's method or Tape and theodolite method.
7. To set Simple circular curve by Two theodolite method.
8. To Prepare Contour maps for given area by grid method using leveling Instrument.
9. To develop the knowledge on usage of Total station.
10. To perform RDM application and find the distance between inaccessible points by Total station.
11. To perform REM application to find the elevation by Total station.
12. To Calculate area for given plot by Total station.

TEXT BOOKS AND REFERENCES:

1. Surveying Vol-I by Dr K.R. Arora.
2. Surveying Vol-I by Dr B. C. Punmia.
3. Plane surveying by A M Chandra.

Note: Survey Camp is to be conducted for a minimum period of seven days Using Total Station to train in one of the following areas:

i. Preparation of a contour Plan/ Map.
ii. Earth work Computations for a high way / canal projects
iii. Marking of a Sewer line/ Water supply line.
iv. Any type of Execution works.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3	2

BAPATLA ENGINEERING COLLEGE : : BAPATLA

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STRUCTURAL ANALYSIS, DESIGN AND DETAILING LABORATORY

III B.Tech – II Semester (Code : 18CEL62)

Lectures	0	Tutorial	0		Practical	3	Credits	1
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Students are required to analyze and design the following structures using software package like STAAD/ETABS/GTSTRUDL/STRAP etc. and detailing of structures using SP-34 & AUTO CAD.

Course Objectives:

- To understand the modeling and analysis of indeterminate structures like continuous beams and frames using STAAD and ETABS.
- To learn the basic concepts in analysis and design of slabs, footing and truss using different software's like STAAD and ETABS.
- To know the detailing concepts and usage of SP-34
- To learn the commands to draw the detailing of indeterminate beams, slabs, footings, retaining walls and plate girder using AUTO CAD

COURSE OUTCOMES

Upon successful completion of this course, student will be able to

CO1 Understand the application of computer softwares in civil engineering field.
CO2 Understand structural modeling techniques and different tools available.
CO3 Compare the modelling techniques of steel and RCC structure.
CO4 Sketch the deatilings of beams ,columns and slabs.

Experiments

1. Indeterminate beams.
2. Plane roof truss.
3. Plane frame subjected to gravity loads and lateral load (wind load).
4. SPACE(3D) frame analysis for gravity and lateral loading.
5. One-way slab.
6. Two way slab.
7. Isolated footing.
8. Pile foundation.
9. Combined footing.
10. Cantilever Retaining wall.

11. Plate girder.
12. Column base.

TEXT BOOKS:

1. Limit State Design of Reinforced Concrete by P. C. Varghese, Prentice Hall of India.
2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand &Bros.,Roorkee
3. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishing house
4. Reinforced Concrete Structures by N. Subramanian, Oxford University Press.

REFERENCE BOOKS:

1. Reinforced concrete design by Pillai and Menon, Tata McGraw-Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune VidyarthiGrihaPrakashan, Pune.
3. Reinforced concrete design: Principles and Practice by N. Krishna Raju., R. N. Pranesh, New Age International Publishers.
4. Reinforced Concrete Structure by R. Park., T. Paulay, Wiley India Publishers

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	3	-	-	-	2	-	-	-	-	-	-	-	-	3	2
CO2	2	3	-	-	-	2	-	-	-	-	-	-	-	-	3	2
CO3	2	3	-	-	-	2	-	-	-	-	-	-	-	-	3	2
CO4	2	3	-	-	-	2	-	-	-	-	-	-	-	-	3	2

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GEOTECHNICAL ENGINEERING LABORATORY
III B.Tech – II Semester (Code : 18CEL63)

Lectures	0	Tutorial	0		Practical	3	Credits	1
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives

The objective of this course is:

- To impart knowledge of determination of index properties required for classification ofsoils.
- To teach how to determine compaction characteristics and consolidation behavior fromrelevant lab tests;
- To determine permeability of soils.
- To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes

Upon successful completion of this course, student will be able to

CO1 To determine Index properties of soils.
CO2 To determine shrinkage and swelling chararcteristics of soils.
CO3 To determine Engineering properties of soils.
CO4 To determine the C.B.R of soils.

List of Experiments:

1. Determination of water content by oven drying method.
2. Determination of specific gravity by (a) Density bottle method (b) Pycnometer method.
3. Gradation analysis a) Mechanical Sieve analysis b) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by a) Core cutter method. b) Sand replacement method.
7. Determination of permeability by a)Constant head permeameter. b) Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test (Demonstration only)
14. Consolidation test.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	1	3	3	3	2	1	1	1	3	3	3	2	3	3	2	3
CO2	1	3	3	3	2	1	1	1	3	3	3	2	3	3	2	3
CO3	1	3	3	3	2	1	1	1	3	3	3	2	3	3	2	3
CO4	1	3	3	3	2	1	1	1	3	3	3	2	3	3	2	3

BAPATLA ENGINEERING COLLEGE:: BAPATLA
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CONSTRUCTION MANAGEMENT
IV B.Tech – I Semester (Code : 18CE701)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives: The subject provides

- To provide a knowledge on project failures, planning and scheduling of a project.
- Knowledge on network techniques like PERT, CPM and Cost Control.
- Exposure to the different types of Resources in Construction.
- Will provide importance of Quality control and Safety Management.

Course Outcomes: At the end of the course student will be able to

CO1 Understand the project failures and the basic concepts of Project Planning and Scheduling.
CO2 Analyzing a network diagram for a project and calculating the cost control.
CO3 Understand the uses and importance of Resources.
CO4 Understand the importance of different Divisions of Construction Management like Quality, safety.

UNIT – I

1. Introduction

Construction projects; Project management; Main causes of project failure.

2. Planning and Scheduling

Steps involved in planning; Objectives; Principles; Advantages; Limitations; Stages of planning;

Scheduling, Preparation of construction schedules; Methods of scheduling; Bar charts; Mile stone charts; Controlling; Job layout; Factors affecting job layout; Project work break down; Activities involved; Assessing activity duration.

UNIT – II

3. 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.

4. Program Evaluation and Review Technique (PERT)

Introduction; Time estimates; Earliest expected time; Latest allowable occurrence time; Slack; Critical path; Probability of completion time for a project.

5. Critical Path Method (CPM)

Introduction; Difference between CPM and PERT; Earliest event time; Latest event time; Activity time; Float; Critical activities and critical path.

6. Cost Control

Direct cost; Indirect cost; Total project cost; Optimization of cost through networks; Steps involved in optimization of cost.

UNIT – III

7. Resource Management (Manpower)

Introduction; Resource smoothing; Resource levelling; Establishing workers productivity.

8. Resource Management (Materials)

Objectives of material management; Costs; Functions of material management department; ABC
classification of materials; Inventory of materials; Material procurement; Stores management.

9. Resource Management (Machinery)

Classification of construction equipment; Earth moving equipment; Excavation equipment; Hauling equipment, Earth compaction equipment; Hoisting equipment; Concreting plant and equipment; Time and motion study; Selection of equipment– Task consideration, Cost consideration; Factors affecting the selection; Factors affecting cost owning and operating the equipment; Equipment maintenance.

UNIT – IV

10. Quality Control

Importance of quality; Elements of quality; Organization for quality control; Quality assurance techniques; Documentation; Quality control circles; Total quality management; ISO – 9000.

11. Safety Management

Accident prevention programme; immediate attention in case of accident; Approaches to improve safety in construction; Safety benefits to employers, employees and customers; Prevention of fires in construction industries; Fault free analysis; Safety information system; Safety budgeting.

TEXT BOOKS:

1. Construction Engineering and Management by Dr. S. Seetharaman; Umesh Publications, Nai Sarark, Delhi.
2. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers, NaiSarak; Delhi.

REFERENCE BOOKS:

1. Construction Management & Planning by B. Sengupta& H. Guha; Tata McGraw – Hill Publishing Co. Ltd., New Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L.; McGraw – Hill International Book Company.
3. PERT & CPM Principles and applications by L. S. Srinath; Affiliated East West Press.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	-	2	2	-	3	2	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	2	2	-	-	2	2	-	-
CO3	2	2	-	-	2	-	2	2	2	2	2	-	-	-	-	-
CO4	-	2	2	-	2	2	-	3	2	3	-	2	-	-	-	-

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Elective - III

PRE STRESSED CONCRETE
IV B.Tech – I Semester (Code : 18CED31)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To highlight the concepts of pre-stressing in concrete and materials used for pre-stressing.
- To analyze the general mechanical behavior of pre-stressed concrete members on comparison with those of RCC members.
- To understand various losses of pre-stress and estimate the deflection in pre-stressed concrete members.
- To design pre-stressed concrete beams.
- To analyze and design of end anchorages for pre-stressed concrete members.

Course Outcomes:

CO1 Understand the concepts of pre-stressing in concrete and state the necessity for high strength steel and concrete in PSC and explanation of the various types of pre-stressing systems.`

CO2 Understand the difference in the analysis of general mechanical behavior of PSC and RCC members.

CO3 Evaluate the total losses allowed for design of PSC members and estimating the deflection in PSC members.

CO4 Analyzing and designing the end anchorages for pre-stressed concrete members.

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UNIT – I

1. Introduction Basic concepts of prestressing; Need for High strength steel and High strength concrete; Advantages of prestressed concrete.
2. Materials For Prestressed Concrete High strength concrete; High tensile steel.
3. Prestressing Systems Tensioning devices; Hoyer's long line system of pretensioning; Post tensioning systems; Detailed study of Freyssinet system, Lee-McCall System and Gifford – Udall system;
4. Analysis Of Prestress And Bending Stresses Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment.

UNIT – II

5. Losses of Prestress Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.
6. Deflections of Prestressed Concrete Members; Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members

UNIT – III

7. Elastic Design of Prestressed Concrete Sections for Flexure Permissible compressive stresses in concrete as per IS 1343; Design of rectangular and I – sections of TYPE 1, TYPE 2 (Elastic Design only).

UNIT – IV

8. Shear Resistance Shear and Principal Stresses; Ultimate shear resistance of prestressed concrete members; Design of shear reinforcement.
9. Transfer of Prestress in Pre–Tensioned Members & Flexural Bond Stresses Transmission of prestressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre –tensioned and post – tensioned grouted beams.
10. Anchorage Zone Stresses in Post-Tensioned Members Stress distribution in end block; Anchorage zone reinforcements; Design of anchorage and end block as per IS 1343.

TEXT BOOKS:
Prestressed Concrete by N. Krishna Raju; Tata McGraw - Hill Publishing Company Limited, NewDelhi.

REFERENCE BOOKS:
1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons.
2. Prestressed Concrete by P.Dayaratnam. Oxford & IBH
3. Prestressed Concrete by N.Raja Gopalan. PH

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	1	1	1	-	-	1	-	-	-	-	-	-	3	1	-	-
CO2	3	2	3	-	-	1	-	-	-	-	-	-	3	2	-	-
CO3	3	2	3	-	-	1	-	-	-	-	-	-	3	1	-	-
CO4	2	2	2	-	-	1	-	-	-	-	-	-	3	1	-	-

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

Elective - III

ENVIRONMENTAL GEOTECHNICS
IV B.Tech – I Semester (Code : 18CED32)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To introduce soil structure and clay minerals.
- To know characteristics and classification of wastes
- Introducing hydrology of contaminants.
- Introducing methods of disposal and site remediation

Course Outcomes:

At the end of the course, the student will be able to,

CO1 Understand soil structure and clay minerals
CO2 Understand characteristics and classification of wastes
CO3 Understand characteristics and classification of wastes
CO4 Understand methods of disposal and site remediation

UNIT-I

CLAY MINERALOGY AND SOIL STRUCTURE

Clay mineralogy and soil structure: Gravitational and surface forces-inter sheet and inter layer bonding in the clay minerals- Basic structural units of clay minerals- isomorphous substitution – kaolinite mineral- montmorillonite mineral- illite mineral- electric charges on clay minerals – base exchange capacity- diffused double layer- adsorbed water- soil structure- methods for the identification of minerals (introduction only).

UNIT-II

CHARACTERISTICS AND CLASSIFICATION OF WASTES

Wastes and Contaminants (introduction only): sources of wastes-types of wastes-composition of different wastes- characteristics and classification of hazardous wastes- generation rates-Soil water environment interaction relating to geotechnical problems-Effect of pollution on soil water behaviour-Case studies of foundation failures by ground contamination.

UNIT-III

HYDROLOGY OF CONTAMINANTS

Transport phenomena in saturated and partially saturated porous media-contaminant migration and contaminant hydrology- Ground water-pollution downstream for landfills due to Leachate migration-Passive containment systems – Containment control systems- liners and covers for waste disposal- rigid liners- flexible liners.

UNIT-IV

METHODS OF DISPOSAL AND SITE REMEADIATION

Criteria for selection of sites for waste disposal – Surface and subsurface waste disposal techniques-Ground modification techniques in waste management – Physical modification-Thermal modification-chemical modification-Bioremediation-Geotechnical properties of wastes-Bearing capacity of landfill sites-foundation for waste fill ground.

TEXT BOOKS

1.Mitchell, J (1976), "Fundamentals of soil behaviour", John Wiley and sons, New York

2. Daniel,B.E., " Geotechnical Practice for Waste disposal ", Chapman and Hall, London, 1993.

3. Iqbal,H.Khan "Text book of Geotechnical Engineering" Second Edition

REFERENCES

1. Lambe, T. W & Whitman, R. V (1979), "Soil Mechanics ", John Wiley and Sons, New York.

2. Gopal Ranjan& A.S.R Rao (1991), "Basic and Applied Soil Mechanics, Wiley Eastern Ltd., New Delhi.

3. Wilson, M. J (1987), "A Hand book of Determinative methods in Clay Mineralogy", Chapman and Hall, New York.

4. Robert M. Koerner (1984), "Construction and Geotechnical methods in FoundationEngineering", McGraw Hill Book Co., New York.

5. Yong R. N. (1992), "Principles of contaminant Transport in Soils, "Elsevier, New York. Ramanatha Iyer T. S (2000), "Soil Engineering Related to Environment", LBS centre.

6.Lagrega, M.D., Buckingham, P.L. and Evans, J.B., " Hazardous Waste Management McGraw Hill, Inc., Singapore, 1994.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - III

LOW COST HOUSING TECHNIQUES
IV B.Tech – I Semester (Code : 18CED33)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To examine the present housing scenario in India.
- To introduce the economic issues related to housing especially in developing countries like India.
- To know Building by-laws for housing and housing for urban poor.
- Introducing low-cost housing techniques
- Introducing building materials for low-cost housing
- Introducing traditional practices for low-cost housing
- To give an introduction on design concepts of seismic resistant structures and to understand earth quake resistant design.

Course Outcomes:

At the end of the course, the student will be able to,

CO1 Understand Housing Scenario and Housing Finance

CO2 Apply Building by-laws for urban planning and Housing for Poor

CO3 Apply Low Cost Housing Techniques

CO4 Use Building Materials for low cost Housing

CO5 Apply concepts of Traditional practices of Rural Housing Technology and design concepts of seismic resistant structures.

UNIT-I

1. Housing Scenario Introducing- Status of urban housing- Status of Rural Housing-

2. Housing Finance: Introducing- Existing finance system in India- Government role as facilitator- Status at Rural Housing Finance- Impedimental in housing finance and related issues

UNIT-II

3. Land use and physical planning for housing: Introduction- Planning of urban land- Urban land ceiling and regulation act- Effectincey of building bye laws- Residential Densities

4. Housing the urban poor: Introduction- Living conditions in slums- Approaches and strategies for housing urban poor

UNIT-III

5. Development and adopt on of low cost housing technology: Introduction- Adoption of innovative cost effective construction techniques- Adoption of precast elements in partial prefabrication- Adopting of total prefabrication of mass housing in India- General remarks on pre-cast rooting/flooring systems- Economical wall system- Single Brick thick loading bearing wall- 19cm thick load bearing masonry walls- Half brick thick load bearing wall- Flyashgrypsym thick for masonry- Stone Block masonry- Adoption of precast R.C. plank and join system for roof/floor in the building.

UNIT-IV

6. Alternative building materials for low-cost housing: Introduction- Substitute for scarce materials- Ferro cement- Gypsum boards- Timber substitutions- Industrial wastes- Agricultural wastes

7. Low-cost Infrastructure services: Introducing- Present status- Technological options- Low-cost sanitation's- Domestic wall- Water supply- energy

UNIT-V

8. Rural Housing: Introduction- traditional practice of rural housing continuous - Mud Housing technology- Mud roofs- Characteristics of mud- Fire resistant treatment for Thatched roof- Soil stabilization- Rural Housing programs

9. Housing in Disaster Prone areas: Introduction- Earthquake- Damages to houses- Traditional Houses in disaster prone areas Type of Damages and Railways of non-engineered buildings- Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions - Requirements of structural safety of thin precast roofing units against - Earthquake forces- Status of R& D in earthquake strengthening measures- Floods- cyclone- future safety

TEXT BOOKS AND REFERENCE BOOKS:

1. Building materials for low –income houses – International council for building research studies and documentations.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of Concrete – Neville A.M. Pitman publishing Limited- London.
4. Light weight concrete- Academic kiado- Rudhai .G – Publishing home of Hungarian Academy of Sciences 1963.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective – III

REPAIR & REHABILITATION OF STRUCTURES
IV B.Tech – I Semester (Code : 18CED34)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To learn various distress and damages to concrete and masonry structures and to understand the importance of maintenance of structures
- To apply Non-Destructive Testing techniques to field problems and to learn the importance of methods of substrate preparation
- To study the various types and properties of repair materials
- To apply cost effective retrofitting strategies for repairs in buildings.

Course Outcomes:

CO1 Understand the need for rehabilitation of structures and their maintenance and evaluation of the damages in R C Buildings and masonry structures.
CO2 Equip student with concepts of NDT and evaluation and to understand the importance of methods of substrate preparation.
CO3 Knowing the various types of repair materials available and to understand their behavior and properties of repair materials.
CO4 Knowing various methods of crack repair and application of the cost-effective retrofitting strategies for repairs in buildings.

UNIT-I

Introduction Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures. Cracks in R.C. buildings Various cracks in R.C. buildings, causes and effects Maintenance importance of maintenance, routine and preventive maintenance. Damages to masonry structures Various damages to masonry structures and causes.

UNIT-II

Damage diagnosis and assessment Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test,Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement Substrate preparation Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning.

UNIT-III

Repair materials Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials Special mortars and concretes Polymer Concrete and Mortar, Quick setting compounds Grouting materials Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and

Urethane grouts. Bonding agents Latex emulsions, Epoxy bonding agents. Protective coatings Protective coatings for Concrete and Steel FRP sheets .

UNIT-IV

Crack repair Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks. Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, reinforced concrete jacketing, Steel jacketing, FRP jacketing. Strengthening, Beam shear strengthening, Flexural strengthening.

TEXT BOOKS

1. “Repair and protection of concrete structures” by Noel P.Mailvaganam, CRC press London.

2. “Concrete repair and maintenance Illustrated” by Peter.H.Emmons, Galgotia publishers.

3. “Earthquake resistant design of structures” by Pankajagarwal, Manish shrikande, PHI.

REFERENCE BOOKS

1. “Failures and repair of concrete structures” by S.Champion, John wiley and sons.

2. “Diagnosis and treatment of structures in distress” by R.N.Raikar Published by R & D centre of structural designers and consultants pvt.ltd, Mumbai.

3. “Handbook on repair and rehabilitation of RCC buildings”, CPWD, Government of India.

4. “Handbook on seismic retrofit of buildings”, CPWD, Indian buildings congress, IIT Madras, Narosa Publishing House.

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Elective - IV

RAILWAY AND AIRPORT ENGINEERING
IV B.Tech – I Semester (Code : 18CED41)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Prerequisites: Surveying (18CE302) Highway Engineering (18CE604)

Course Objectives:

- To discussvarious components of railway track and their requirements.
- To design the geometrics of railway track.
- To design the runway geometric.
- To design the runway pavement and discuss various facilities of a harbor and port.

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Course Outcomes: Student will be able to

CO1 Explain the various components for laying a railway track.
CO2 Identify the various geometrical elements required for a railway track.
CO3 Understanding the Planning and design runway geometrics.
CO4 Outline the various components and their features of harbor and port.

UNIT-I

1. INTRODUCTION TO RAILWAYS

Comparison of railway and highways transportation; Classification of Indian railways.

2. COMPONENTS OF RAILWAY TRACK

Gauges in Railway Track, Coning of Wheels, Permanent way-Rails-Types, Rail failures, Creep of Rails, Rail Joints-Types of Joints, Sleepers-Types, Comparison of sleepers, Ballast and formation-Types of Ballast materials- Specifications of Indian Railways.

UNIT-II

3. GEOMETRIC DESIGN OF RAILWAY TRACK

Geometric Design Of Track-Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve.

4. POINTS AND CROSSINGS & SIGNALLING

Switches, Components and types of crossing, Turnouts and its working principle, Classification of signals.

UNIT-III

5. AIRPORT PLANNING AND DESIGN
Aero plane components; Air–craft characteristics; Selection of site for airport; Typical airport layouts; Airport Obstructions-Zoning laws; Classification of obstructions;

6. RUNWAY DESIGN
Runway Design-Runway orientation; Basic runway length; Corrections for elevation; Temperatureand gradient; Runway geometric design

UNIT-IV

7. AIRFIELD PAVEMENT DESIGN
Design of Airport Pavements- Design methods for flexible airfield Pavement- CBR Method, Mcleod Method and rigid pavement Design- PCA Method; LCN Method of pavement design.

8. HARBOUR ENGINEERING
Harbour layout: types of harbours, port terms, site selection, Break Waters, Piers and wharves, dry docks and slipwaves.

TEXT BOOKS:
1. Railway Engineering by S.C.Saxena and S.Arora DhanpatRai Publications (P) Ltd.
2. Airport Planning and Design by S. K. Khanna& M. G. Arora; Nemchand & Bros, Roorkee
3. Dock and Harbour Engineering by Dr. S.P. Bindra, DhanpatRai& Sons

REFERENCE BOOKS:
1. Railway Engineering by M.M.Agarwal; Prabha& Co, New Delhi
2. Airport Engineering by G.V.Rao; Tata McGraw Hill, New Delhi.
3. Dock and Harbour Engineering by Hasmukh P. Oza, Gautam H. Oza, Charotar Publishing House, 8th Revised Edition : 2016.

NPTEL:
http://nptel.ac.in/courses/105107123/
http://nptel.ac.in/courses/105101008/
http://nptel.ac.in/courses/114106025/

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	2	3	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	2	2	-	-
CO4	2	2	3	-	-	-	-	-	-	-	-	-	2	3	-	-

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Elective - IV

GROUND WATER DEVELOPMENT AND MANAGEMENT
IV B.Tech – I Semester (Code : 18CED42)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To provide knowledge on groundwater availability and distribution in different types of rocks
- To demonstrate the groundwater movement and groundwater reservoir parameters
- To develop the skills needed for ground water investigation
- To study the concept of artificial recharge of ground water
- To estimate the groundwater management concepts

Course Outcomes:

The student will be able to

CO1 Understand the location of ground water and the relationship with the rock type.
CO2 Assess the ground water movement and reservoir parameters
CO3 Use of the different techniques of ground water investigation
CO4 Apply RS & GIS techniques for artificial recharge of groundwater.
CO5 Apply conjunctive use technique for effective management of groundwater.

UNIT I

Introduction:

Ground Water Occurrence, Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

Ground Water Movement:

Permeability, Darcy's law, storage coefficient, Transmissivity, differential equation governing ground water flow in three dimensions derivation, Ground water flow contours and their applications.

UNIT II

Analysis of Pumping Test Data – Steady flow

Steady flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well and well tests.

Analysis of Pumping Test Data- Unsteady flow

Unsteady flow towards a well – Non equilibrium equations – Theis solution – Jocob and Chow's simplifications, Leaky aquifers.

UNIT III

Surface and Subsurface Investigation

Surface methods of exploration - Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

Artificial Recharge of Ground Water

Concept of artificial recharge – recharge methods, relative merits. Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT IV

Saline Water Intrusion

Occurrence of Saline Water intrusion– Relation between fresh and saline waters – Ghyben–Herzberg equation – Shape and structure of fresh–salt water interface – Upcoming of saline water – Control of saline water intrusion – Examples of seawater intrusion.

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:

1 Groundwater by H.M. Raghunath, New Age International, 2008.
2 Ground water Hydrology by David Keith Todd, John Wiley & Sons, 1980

REFERENCES:

1. Fundamentals of Ground Water by Franklin W. Schwartz and Hubao Zhang, Wiley India Pvt.Ltd., 2012.
2. Groundwater System Planning & Management by R. Willis & W.W.G. Yeh, Printice Hall,1987.

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Elective - IV

FINITE ELEMENT ANALYSIS
IV B.Tech – I Semester (Code : 18CED43)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- Equip the students with the fundamentals of finite element analysis
- Enable the students to formulate the design problems into FEA
- Enable the students to solve Boundary value problems using FEM

Course Outcomes:

CO1 Understand the basic concept of FEM

CO2 Solve simple boundary value problems using Numerical technique of Finite element method

CO3 Develop finite element formulation of one dimensional and beam problems and solve them

CO4 Develop FEM formulation of truss element

CO5 Compute plain stresses and plain strains problems

UNIT -I

1. **BASIC PRINCIPLES OF STRUCTURAL MECHANICS:** A brief history of F.E.M, Need of the method, Applications of FEM, Review of basic principles of solid mechanics, Basic equation in Elasticity Equations of equilibrium, Constitutive relationship, Concept of Axi-symmetric elements. Concept of Energy Principles and method
2. **ELEMENT PROPERTIES:** Basic theory relating to the formulation of the finite element method, element shapes ,nodes , nodal degree of freedom, node numbering, Coordinate system (local and global), Convergence requirements, Compatibility requirement, Geometric Invariance

UNIT-II

3. **Finite element analysis of - single bar element**: (One –Dimensional problem) – Shape functions, derivation of stiffness matrix, stress-strain relations– All with reference to bar element and trusses under axial forces.
4. **Finite element formulation of beam elements**: Beam stiffness-assemblage of beam stiffens matrix- example on analysis of beam subjected to concentrated and distributed loading

UNIT-III

5. **Finite element formulation of truss element**: Stiffens matrix-properties –selection of approximate displacement functions'- solutions of a plane truss –transformation matrix –Galerkins's method for 1-D truss-Computation of stress in a truss element.

UNIT-IV

6. **PLANE STRESS AND PLANE STRAIN ANALYSIS:** Finite element formulation for plane stress and plane strain problems Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces
7. **Iso-parametric formulation**: An iso parametric bar elements-plane bilinear iso parametric element-quadratic plane element-shape functions evaluations of stiffness matrix,

TEXT BOOK:

- Finite Element Analysis - Theory and Programming by C. S. Krishnamoorthy; Tata Me Graw - Hill Publishing Co.Ltd., New Delhi

2. "Introduction to Finite Elements in Engineering", Tirupathi R. Chandrupatla, Ashok D

3. Finite Element Analysis", by S.S.Bhavikatti, New Age International Publishers

REFERENCE BOOK:

1. Introduction to the Finite Element method - A Numerical method for engineering analysis by Desai & Abel; CBS Publishers & Distributors., Delhi
2. The finite element method in engineering by S. S.Rao, Butterworth-Heinemann, New Delhi, 1999

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - IV

SOLID AND HAZARDOUS MANAGEMENT
IV B.Tech – I Semester (Code : 18CED44)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To explain brief introduction about suitable methods for collection, transport, recovery, reuse and disposal of solid waste.
- To explain brief introduction about various functional elements of hazardous waste management.
- To introduce various physicochemical methods of solid and hazardous waste treatment with special emphasis on recovery and reuse of solid waste.
- To introduce various biological methods of solid and hazardous waste treatment.

Course Outcomes:

CO1 Explain municipal solid waste management systems with respect to its physical properties, types and composition of solid waste with methods of handling, sampling and storage of solid waste.
CO2 Explain hazardous waste management systems with respect to its physical properties, types, composition of waste and their health effects.
CO3 Appraise the current practices available and physicochemical methods of handling, sampling and disposal of solid and hazardous waste
CO4 Select the appropriate biological methods for solid waste collection, transportation, redistribution and disposal.

UNIT –I

Municipal Solid Waste Management – Fundamentals

Introduction of solid waste; Sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options

UNIT-II

Hazardous Waste Management – Fundamentals

Characterization of waste; compatibility and flammability of chemicals; fate and transport of chemicals; health effects

UNIT- III

Physicochemical Treatment of Solid and Hazardous Waste

Chemical treatment processes for MSW (combustion, stabilization and solidification of hazardous wastes); physicochemical processes for hazardous wastes (soil vapor extraction, air stripping, chemical oxidation); ground water contamination and remediation

UNIT – IV

Biological Treatment of Solid and Hazardous Waste
Composting; bioreactors; anaerobic decomposition of solid waste; principles of biodegradation of toxic waste; inhibition; co-metabolism; oxidative and reductive processes; slurry phase bioreactor; in-situ remediation

REFERENCES/TEXT BOOKS:

1. VesilindP.A.,WorrellW.andReinhartD.R.,"SolidWasteEngineering",ThomsonBooks.
2. BhideA.D.andSundaresanB.B.,"Solid Waste Management, Collection, Processing and Disposal",Nagpur.
3. Pichtel, John. Waste Management Practices:Municipal,Hazardous and Industrial.CRC Press, Taylor and Francis Group,2005.
4. LaGrega,MichaelD.,Buckingham,PhilipL.andEvans,JeffreyC.HazardousWaste Management. Waveland Press Inc., Reissue Edition,2010.

Video Lectures (Web Links):

1. http://nptel.ac.in/courses/105106056/

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Institution Elective - I

AIR POLLUTION & CONTROL
IV B.Tech – I Semester (Code : 18CE101)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To take up the basic concepts of sources and effects of Air Pollution
- The contents involved the knowledge of the effect of metrological parameters on air pollution
- The contents involved the knowledge of the control of air pollution from particulates
- To develop skills relevant to control of gaseous pollution and also introduce about Air Quality Management

Course Outcomes: On the completion of the course, one should be able to understand:

CO1 Understand the sources of Air Pollution and effects of Air Polluction on plants, Human beings and structures.
CO2 Analyse the effect of air pollution with meteorological parameters.
CO3 Apply the particulate control at source level by various devices.
CO4 Analyse and develop various gaseous pollution control technologies and estimate the quality monitoring of air pollutants.

UNIT –I

Air Pollution –Definitions, Air Pollutants–Classifications –Natural and Artificial– Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution-stationary and mobile sources.

Effects of Air pollutants on man, material land vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT –II

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomenon Air Quality-wind rose diagrams.

UNIT – III

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Theory and problem related to Gaussian dispersion model.

Control of particulates –Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's–Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

General Methods of Control of NOx and Sox emissions–In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management–Monitoring of SPM, SO;NO and CO Emission Standards.

TEXTBOOKS:

1.Airpollution By M.N.Rao and H.V.N.Rao –Tata Mc.Graw Hill Company.
2.AirpollutionbyWarkand Warner. -Harper & Row, NewYork.

REFERENCE BOOK:

1. An introduction to Air pollution by R.K.Trivedy and P.K.Goel,B.S.Publications

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	3	-	1	-	3	3	1	-	-	-	-	3	3	1	2
CO2	3	2	3	1	2	1	2	-	-	-	-	-	2	2	1	1
CO3	3	3	3	2	2	1	3	-	-	-	-	1	2	3	2	2
CO4	2	3	3	3	2	1	3	1	-	-	-	1	2	3	2	1

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Institution Elective - I

RURAL WATER SUPPLY AND ENVIRONMENT SANITATION

IV B.Tech – I Semester (Code : 18CE102)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- Apply knowledge of basic sciences and engineering to analyze water resources systems for socio-economic development.
- Identify the sources of water and their characteristics.
- Identify and select criteria for the selection of sanitation technology
- To learn about analytical & design methods for environmental systems.

Course Outcomes:
At the end of the course the student will be able to:
CO1 Identify problems pertaining to rural water supply and sanitation.
CO2 Design water supply and sanitation system for rural community.
CO3 Design low-cost waste management systems for rural areas.
CO4 Plan and design an effluent disposal mechanism.

UNIT - I

WATER SUPPLY: Issues of rural water supply –Various techniques for rural water supply-merits- National rural drinking water program- rural water quality monitoring and surveillance-operation and maintenance of rural water supplies

UNIT - II

LOW-COST WATER TREATMENT: Introduction – Epidemiological aspects of water quality methods for low cost water treatment - Specific contaminant removal systems

UNIT - III

RURAL SANITATION: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas stabilization ponds - septic tanks - Imhoff tank- soak pits- low-cost excreta disposal systems Effluent disposal.

UNIT - IV

4. INDUSTRIAL HYGIENE AND SANITATION: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort- Industrial plant sanitation. SOLID WASTE MANAGEMENT: Disposal of Solid Wastes- Composting- land filling incineration- Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

TEXT BOOKS:

1. Eulers, V.M., and Steel, E.W., Municipal and Rural Sanitation, 6 th Ed., McGraw Hill Book Company, 1965.
2. Park, J.E., and Park, K., Text Book of Preventive and Social Medicine, Banarsidas Bhanot, 1972

REFERENCE BOOKS:

1. Wright, F.B., Rural Water Supply and Sanitation, E. Robert Krieger Publishing Company, Huntington, New York, 1977.
2. Juuti, P., Tapio S. K., and Vuorinen H., Environmental History of Water: Global Views

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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DESIGN AND DETAILING OF IRRIGATION STRUCTURES LABORATORY
IV B.Tech – I Semester (Code : 18CEL71)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives

- To explain design of various Irrigation Structures
- To describe detailing of various Irrigation Structures
- To explain detailing of various Irrigation Structures using AutoCAD software
- To demonstrate developing a spreadsheet using MS-EXCEL software of various Irrigation structures

Course Outcomes: Student will be able to

CO1 To design various Irrigation structures
CO2 To detail various Irrigation structures
CO3 To detail various Irrigation structures using AutoCAD software
CO4 To develop a spreadsheet using MS-EXCEL software of various Irrigation structures

Students are required to design the following Irrigation structures using Excel Spread sheets software and detailing using software packages like Auto CAD/Micro station etc.,

Note: A minimum of FOUR (4 No) shall be done and recorded

1. Irrigation canal.
2. Canal drop – Notch type.
3. Canal regulator.
4. Vertical drop weir on permeable foundations.
5. Syphon Aqueduct (Type – III Aqueduct).
6. Profile of a Ogee spillway.

TEXT BOOKS

1. Design of Minor Irrigation and Canal Structures by C. Satyanarayana Murthy; Wiley Eastern Ltd., New Delhi.
2. Irrigation and Water Power Engineering by Dr. B.C.Punmia&Dr.Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

TRANSPORTATION ENGINEERING LABORATORY
IV B.Tech – I Semester (Code : 18CEL72)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Prerequisites: Geotechnical Engineering Lab (18CEL63)

Course Objectives:

- To assess the physical properties of aggregates and bitumen for road construction.
- To assess the properties of bituminous mix.
- To evaluate the sub-grade soil properties.
- To measure the unevenness of the pavement surface.

Course Outcomes: Student will be able to

CO1 Calculate the physical properties of aggregate and bitumen for road construction.
CO2 Develop the Job mix formula for Bituminous mixes.
CO3 Examine the feasibility of soil as a suitable material in road construction.
CO4 Analyze the roughness of pavement surface.

A. Tests on Aggregates

1. Aggregate Crushing value test.
2. Aggregate impact value test.
3. Los Angele's abrasion test.
4. Deval's attrition value test.
5. Shape test a) Flakiness index test b) Elongation index test c) Angularity number test. .
6. Specific gravity Test.

B. Tests on Bituminous Materials

7. Penetration test.
8. Softening point test.
9. Flash and fire point test.
10. Ductility test.
11. Viscosity test.
12. Bitumen Extractions Test.
13. Specific gravity of Bitumen.

C. Test on Bituminous Mixes

14. Marshall stability test.

D. Test on Soil Sub grade

15. California bearing ratio test.
16. Dynamic cone penetrometer test

E. Pavement Evaluation

17. Roughness of pavement by using MERLIN

TEXT/REFERENCE BOOKS:

1. S.K. Khanna, C. E. G. Justo, A.Veeraragavan" Manual on Highway Materials and Pavement Testing" Nem Chand Bros, Roorkee (2013). Revised 5th Edition.
2. Laboratory Manual in Highway Engineering by Ajay K. Duggal and Vijay P. Puri - New age Publishers.
3. Bureau of Indian standards, Indian standard methods of test for soils, Part-16, Laboratory determination of CBR, IS:2720 (part-16)-1987 Reaffirmed 1997.
4. Bureau of Indian standards, Indian standard methods of test for aggregate for concrete, mechanical properties, IS:2386-1963 (Reaffirmed 1997).
5. Bureau of Indian standards, Indian standard specification of coarse and fine aggregate from Natural sources for concrete, IS:383-1970 (Reaffirmed 1997).
6. Bureau of Indian standards, IS: 1201-1220(1978), Indian standard methods for testingTar and Bituminous materials.
7. Bureau of Indian standards IS: 73-2013, Indian standard Paving Bitumen - Specification.
8. Ministry of Road Transport and Highways- Specifications for Roads and Bridge Works, Fifth Revision, IRC, New Delhi, India-2013

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	1	-	3	-	-	-	-	-	2	-	-	-	-	2	3
CO2	2	2	-	2	-	-	-	-	-	2	-	-	-	-	2	3
CO3	2	1	-	3	-	-	-	-	-	2	-	-	-	-	2	3
CO4	2	2	-	1	-	-	-	-	-	2	-	-	-	-	2	2

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

QUANTITY ESTIMATION & PROJECT MANAGEMENT
IV B.Tech – I Semester (Code : 18CEL73)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- To estimate the quantities of various items of a Residential Buildings.
- To evaluate the Quantity of steel for Building elements
- To determine the project duration and finding the critical path of the projects.

Course Outcomes: At the end of the course student will be able to

CO1 Calculate the quantities of various civil engineering projects.
CO2 Prepare project networks for various civil engineering projects and able to find out the critical path and project completion time.
CO3 Calculate the quantities of various RCC elements of civil engineering projects along with schedule of bars.

UNIT – I

1.Quantity estimation of a single storey residential building (different items).
2. Cost estimation of a single storey residential building.
3. Quantity estimation of a B.T.Road (different items).
4. Cost estimation of a B.T.Road.
5. Quantity estimation of a Canal (different items).
6. Cost estimation of a Canal.
7. Find out the labour requirement and preparing the Rate Analysis for different items of work.
a) C.C b) R.C.C c) Brick work d) Flooring

UNIT- II

8.Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stone chart.
9. Preparing the Project management report for a single storey residential building by using the network technique (PERT/CPM).
10. Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).
11. Preparing the Project management report for a Canal by using the network technique (PERT/CPM).

UNIT- III

12. Quantity estimation of RCC roof slab and preparing schedule of bars
13. Quantity estimation of RCC beam and preparing schedule of bars
14. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars.
15. Quantity estimation of RCC retaining wall and preparing schedule of bars

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	-	-	-	2	-	-	3	3	3	-	2	-	2	2	-
CO2	3	-	-	-	3	-	-	3	3	3	2	2	-	2	2	-
CO3	3	-	-	-	2	-	-	3	3	3	-	2	-	2	2	-

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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ENGINEERING ECONOMICS & MANAGEMENT
IV B.Tech – II Semester (Code : 18CE801)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

CourseObjectives:

CourseOutcomes:

CO1 Acquire the basic knowledge of Economics in Construction Projects.
CO2 Understand the knowledge of different laws in setting of an organization.
CO3 Understand the basic concept of approaches to organization and management.
CO4 Identify the concepts of different classifications and nature of the organization.

UNIT-I

Introduction: Economics-flow in an Economy, Law of Supply and Demand, Concepts of Engineering Economics- types of Efficiency, Definition and Scope of Engineering Economics, Elements of Cost, Other Costs/ Revenues – Marginal Cost, Marginal Cost, Marginal Revenue, Sunk Cost, Opportunity Cost, Break – Even Analysis, Profit/ Volume Ratio.

Elementary Economic Analysis; Introduction, Examples for Simple Economic Analysis – Material selection for a product, Design selection for a product, Design selection for a process industry, building material selection for construction activities Process planning/ process modification.

UNIT-II

The Organisational Setting: the nature of organizational behavior- the meaning of organizational behavior, the study of organizational behavior, a frame work of study, influences on behavior, multidisciplinary approach, organizational metaphors, orientations to work and the work ethic, management as an integrating activity, the psychological contract, the peter principle, Parkinson's Law, the changing world of work organisations, globalization and the international context, a cross cultural approach to management, Organisational behavior culture-bound, five dimensions of culture, emerging frameworks for understanding culture, convergence or culture-specific organsational behavior, the importance of organisation behavior.

UNIT-III

Approaches to Organisation and Management: theory of Management, Developments in management and organizational behavior, the classical approach, scientific management,

relevance of scientific management, bureaucracy – main characteristics, Criticisms, Evaluation, human relations - approach, evaluation, Neo-human relations. The systems approach, decision making approach, social action, relevance to management and organizational behavior.

UNIT-IV

The Nature and Context of Organizations; Perspectives of the organization, formal organsation, basic components of an organization, private and public sector organisations, social enterprise organization, production and service organisations, types of authority and organisations, classification of organisations, comparative study of organisations, organizational conflict contrasting views of conflict, positive and negative outcomes of conflict, sources of conflict. Strategies for managing conflict, organizational stress, causes of stress, coping with stress, the work /life balance, the organization of the future.

TEXT BOOKS

1. R. Panneerselvan, engineering economics, PHI Learning Private Limited2012
2. Laurie J. Mullins, Management and Organizational Behavior, Pearson Education Limited, 2010.

REFERENCES

1. Robbins, Stephen, S. Sanghi, Organizational Behavior, Pearson Education. 2010.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	1	-	2	2	-	2	-	-	-	1	1	-	-
CO2	-	1	-	1	2	-	3	3	-	-	2	2	-	-	1	-
CO3	-	1	-	1	2	-	3	3	-	-	2	2	-	-	1	-
CO4	-	1	-	2	2	-	3	3	-	-	2	2	-	-	1	-

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Institution Elective - II

DISASTER MANAGEMENT
IV B.Tech – II Semester (Code : 18CEI03)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:
The subject provides
- Clear knowledge of Disaster, Hazards and Vulnerabilities.
- Knowledgeof Mechanism of Disaster Management.
- Clear idea of Capacity Building.
- Explains how to do the planning for disaster management.

Course Outcomes:
At the end of the course student will be able to
CO1 Understand the importance of Disaster Management.
CO2 Exposure on Basic mitigation techniques of various disasters.
CO3 Knowing about various responding agencies for different kinds of Disasters.
CO4 Enchancing the knowledge of recovery methodologies after Disaster.

UNIT-I

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)
Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards.

UNIT-II

Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigationand Preparedness - Planning for Relief.

UNIT-III

Capacity Building: Capacity Building: Concept - Structural and Nonstructural MeasuresCapacity Assessment; Strengthening Capacity for Reducing Risk - Counter-DisasterResources and their utility in Disaster Management - Legislative Support at the state andnational levels

UNIT-IV

Coping with Disaster: Coping Strategies; alternative adjustment processes –Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management.

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans.

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency GovtofIndia.
2. Disaster Management by MrinaliniPandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education(India) Pvt Ltd Wiley 2015.

REFERENCES:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BSPublications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India(http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	-	-	-	-	-	2	1	-	-	2	-	2	1	1	-	-
CO2	-	-	1	-	1	2	3	-	2	2	-	2	1	1	-	-
CO3	-	-	-	-	-	1	1	-	3	2	-	2	-	-	-	-
CO4	-	-	1	-	1	3	3	-	3	2	-	3	1	2	2	-

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Institution Elective - II

REMOTE SENSING &GIS
IV B.Tech – II Semester (Code : 18CE104)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- Learn basic concepts of Aerial Photographs.
- Learn basic concepts of remote sensing and its characteristics, satellite sensors and platforms.
- Know about satellite digital image processing and classification techniques.
- Understand the basic concepts GIS, spatial data and analysis
- Applications of GPS in surveying.
- Know various remote sensing and GIS applications in civil engineering

Course Outcomes:

CO1 Analyse the principles and components of photogrammetry & Interpret Information from Aerial Photographs.

CO2 Acquaintance with the Foundations of Remote Sensing, Satellite Sensors and Platforms, and Hands-On Experience with Satellite Image Classification.

CO3 Acquire a Fundamental Knowledge of Geographic Information Systems and Cartography. Evaluation of Spatial Data using Overlay Techniques Exposed.

CO4 Discover Ways to Utilise GPS to GeoTag Assets, Add Attributes and Metadata, and Improve Your Awareness of Remote Sensing and GIS in Civil Engineering Applications.

UNIT- I

PHOTOGRAMMETRY:

Fundamentals of Photogrammetry and Photo interpretation – types of photographs;Vertical photographs – principal point; scale; Stereoscopy; Overlap, side lap and flight planning.

UNIT – II

REMOTE SENSING:

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere and target –

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, Space-borne remote sensing. Visual Interpretation Techniques.

Overview of Indian Remote sensing satellites and sensors, satellite definition and types, characteristics of satellite, characteristics of satellite orbit

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Introduction, key components, data entry &preparation – Spatial data input, Raster Data Model, Vector Data Model, Raster Vs Vector. advantages and dis advantages of Raster &Vector network analysis - concept and types, Data storage-vector data storage, attribute data storage.

UNIT - IV

GLOBAL POSITIONING SYSTEM (GPS)&RS AND GISAPPLICATIONS:

GPS definition, components of GPS, GPS receivers. Space, Control and User segments of GPS. Advantages and disadvantages of GPS, Limitations and applications of GPS Indian Systems (IRNSS, GAGAN)Development of GPS surveying techniques, Navigation with GPS, Applications of GPS.

Applications: Photogrammetry, Remote Sensing and Geographical information Systems

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Chang, K. T. (2006). Introduction to Geographic Information Systems. The McGraw-Hill.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
4. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
5. Parkinson,B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications (Volume-I). AIAA, USA

REFERENCE BOOKS:

1. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
2. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt.Ltd, 2013.
3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prentice Hall, New Jersey
4. Paul Wolf, Elements of Photogrammetry, McGraw Hill.
5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Interscience
6. Burrough, P. P. &McDonnel, R. A. (1998). Principles of GIS. Oxford University Press.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	2	-	-	-	-	2	-	-	-	-	-	-	-
CO2	3	2	-	2	3	-	-	-	3	-	3	-	3	-	-	3
CO3	3	2	-	2	3	-	-	-	2	-	3	-	3	-	-	3
CO4	3	2	-	-	3	-	-	-	3	-	1	-	3	-	-	3

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - IV

ADVANCED ENVIRONMENTAL ENGINEERING
IV B.Tech – II Semester (Code : 18CED51)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives

- Describe about the concept of sewage disposal in streams.
- Learn about the available low-cost treatment methods.
- Design construction, operation and maintenance of industrial treatment plants.
- Explain about the sources, characteristics and control of Air Pollution and Noise Pollution.

Course Outcomes

CO1 Acquaint the knowledge of protection of water bodies against Contamination on disposal of wastewater.
CO2 Acquaint new concepts of waste water treatment & design of low-cost treatment units.
CO3 Plan suitable treatment process for selected industrial effluents.
CO4 Acquaint types of air pollutants, their effects and controlling devices to control particulate matter and develops an ability to understand basics of noise sources, effects and Controlling measures

UNIT – I

1. Sludge Treatment and Disposal

Characteristics of sewage sludge; Anaerobic sludge digestion process; Stages of sludge digestion; Factors affecting sludge digestion; Sludge digestion tank; High-rate digestion; Sludge thickening; Sludge conditioning; Methods of dewatering the sludge; Methods of sludge disposal.

2. Stream Sanitation

Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification;

UNIT – II

3. Low-Cost Wastewater Treatment Systems

Introduction; Stabilization ponds (including design aspects); Aerated lagoons; Oxidation ditch; Extended aeration process.

4. New Concepts in Biological Waste Treatment

Introduction; Nitrogen removal by biological nitrification and de-nitrification; Rotating Disc Biological Contactor; U-Tube aeration systems.

UNIT – III

5. Industrial Wastewater Treatment

Characteristics of industrial wastewater, Introduction to Industrial Wastewater treatments. Sugar Plant: Sources and characteristics of liquid waste; Methods of its treatment and disposal. Dairy Industry: Sources and characteristics of liquid waste; Methods of its treatment and disposal. Pulp and Paper Industry: Sources and characteristics of liquid waste; Methods of its treatment and disposal.

UNIT – IV

6. Sources and Effects of Air Pollution

Natural and Anthropogenic sources; Stationary and mobile sources; Primary and secondary pollutants; Particulate matter; Gaseous pollutants; Effects of air pollutants on human health; Effects on plants; Economical effects.

7. Meteorology and Air Pollution

Atmospheric stability and temperature inversions; Design of Stack Height based on Board formulas; Plume rise models; Plume behavior; Gaussian Dispersion Model;

8. Control of Air Pollution

Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.

TEXT BOOKS

1. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf & EddyInc.;TataMcGraw– Hill Publishing Co. Ltd., New Delhi.
3. AirPollution by M.N. Rao and H.V.N.Rao;TataMcGraw–HillPublishingCo.Ltd.,NewDelhi.

REFERENCES

1. Environmental Pollution Control Engineering by C.S.Rao; Wiley Eastern Ltd.,NewDelhi.
2. Water Supply and Wastewater Disposal by G.M. Fair et all; John Wiley &Sons.
3. Sewage Disposal and Air Pollution Engineering by S.K.Garg; Khanna Publications, Delhi.
4. Sewage and Sewage Treatment by S.K. Kshirasagar; Roorkee Publishing House, Roorkee.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - V

BRIDGE ENGINEERING
IV B.Tech – II Semester (Code : 18CED52)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

(Working stress method is to be adopted for all designs)

Course Objectives:

- The main aim of this course is to enable students to choose the appropriate bridge type for a given project and to analyses and design the main components of the chosen bridge.
- Discuss the IRC standard live loads and design the deck slab type bridges.
- Design of T-Beam bridges using various methods.
- Design of sub structure parts of the bridge.
- Design of various bridge foundations and discuss the different types of bridge bearings.

Course Outcomes:

CO1 Classify the different bridges and surveys to be conducted.
CO2 Apply design aspects of culvert subjected to different IRC loads.
CO3 Apply design aspects of T-beam bridge subjected to different IRC loads.
CO4 Describe different loads on piers and abutments.
CO5 Understand the design aspects of bridge foundations and bearings.

UNIT – 1

1. Introduction & Investigation for Bridges

Components of a Bridge; Classification; Need for Investigation; Selection of Bridge Site; Preliminary Data to be Collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Traffic Projection; Choice of Bridge type; Importance of Proper Investigation.

UNIT – II

2. Standard specification for road bridges

IRC Bridge code: width of carriageway: clearances: loads to be considered – dead load: IRC standard live loads: impact effect.

3. Design of Culverts

Design of Reinforced concrete slab culvert.

UNIT – III

4. Design of T – Beam Bridge

Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T – beam bridge.

UNIT – IV

5. Sub Structure for Bridges

Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment.

UNIT – V

6. Foundations for Bridges

Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

7. Bearings for Bridges

Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

TEXT BOOKS

1. Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Design of Bridge Engineering by T.R Jagadeesh, M.A Jayaram, PHI Learning Pvt. Ltd, New Delhi
3. Bridge Engineering by Rangwala, Charotar Publishing House Pvt. Ltd.,

REFERENCE BOOKS

1. Design of Bridges by N. Krishna Raju, Publisher: Oxford & IBH Publishing Co Pvt. Ltd.
2. Bridge Engineering by S. Punnuswamy, (Third Edition 2017) Mcgrawhill Education Pvt. Ltd.

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												**PSO's**			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	2	1	1	-	-	1	-	-	-	-	-	-	3	1	-	-
CO2	3	2	3	-	-	1	-	-	-	-	-	-	3	2	-	-
CO3	3	2	3	-	-	1	-	-	-	-	-	-	3	1	-	-
CO4	2	2	2	-	-	1	-	-	-	-	-	-	3	1	-	-
CO5	2	2	2	-	-	1	-	-	-	-	-	-	3	1	-	-

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - V

WATER RESOURCES FIELD METHODS
IV B.Tech – II Semester (Code : 18CED53)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- Identify soil conservation methods and create a plan to conserve soil in real-life situations
- To provide a comprehensive discourse on the engineering practices of watershed management for realizing the higher benefits of watershed management.
- An ability to use the techniques, skills, and modern modeling software tools necessary for water resource planning and management.
- To identify appropriate measures for mitigating the potential impacts of the proposal

Course Outcomes: Students will be able to

CO1 Students will broadly explore soil erosion to understand the physical mechanisms behind the process of erosion and the impacts that sediment has on water quality.

CO2 The students will be able to apply the knowledge of overall concepts of Watershed which would help to comprehend and analyze for better management.

CO3 They will be able to develop the Rainfall Runoff problems using computer software like ANN and Fuzzy.

CO4 Facilitate informed decision making, including setting the environmental terms and conditions for implementing the proposal.

UNIT – I

1.Operation, Maintenance and Management of Water Resource Project Regulation of reservoirs; diversion works and canals; monitoring behavior of structures; works regulated for maintenance and management; causes of failure of hydraulic structures and their remedial measures.

UNIT – II

2. Impact Assessment of Water Resources Development Projects Ecosystem, impact assessment methodologies, impact assessment of water resources projects – case studies, equilibrium analysis and sustainable development, policy and legislation.

UNIT – III

3. Water Quality Assessment of Management Water movement and mixing process, nutrient cycle and budget, trophic dynamics and biological productivity, water supply and quality for dynamics and management, impact of pollution and toxic substances.

UNIT – IV

4. GIS in Water Resource Planning and Management: Introduction of GIS; Creation of digital geographical data; characteristics of GIS; utilization of GIS for water resources; application for hydrologic modeling.

Practicals - Surface water body mapping, Delineation of watershed, DEM generation: slope, Aspect,flow direction, Flow accumulation, Drainage, network & morphometric analysis.

Practicals - Surface water body mapping, Delineation of watershed, DEM generation: slope, Aspect,flow direction, Flow accumulation, Drainage, network & morphometric analysis.

TEXT BOOKS

1. U.S. Geological Survey (1999). Book 9, Section A: National Field Manual for the Collection of Water-Quality Data. Techniques of Water Resources Investigations of the United States Geological Survey. Washington, D.C.: USGS.
2. Li, Y. and K. Migliaccio (2011). Water Quality Concepts, Sampling, and Analyses. Boca Raton, FL: CRC Press. Pp. 333.
3. Ghanashyam Das, Hydrology and Soil Conservation engineering, Prentice Hall of India Private Limited, New Delhi, 2000.
4. Neuro-Fuzzy and Soft Computing A Computational Approach to learning-Jang, J.R., Sun Chuen-tsaiandMizutaniEiji, Prentice Hall.

REFERENCE BOOK

1. Glenn O. Schwab, Soil and Water Conservation Engineering, John Wiley and Sons, 1981.
2. Rainwater Harvesting Techniques to augment Groundwater- Ministry of Water Resources
3. Neural Networks, A Comprehensive Foundation- Haykin, Prentice Hall India.
4. Introduction to Environmental Impact Assessment- John Glasson, RikiTherivel, Routledge.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - V

GROUND IMPROVEMENT TECHNIQUES
IV B.Tech – II Semester (Code : 18CED54)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To enable the students to acquire the knowledge of ground improvement techniques and their modification, suitability, feasibility and desirability, various methods of in-situ densification in granular soils
- To enable the students to understand various methods of in-situ densification in cohesive soils, principles of reinforced earth and design of reinforced earth walls.
- To impart the students' knowledge of geotextiles and their functions, applications and Tests, various methods of mechanical stabilization.
- To enable the students to understand various methods of cement stabilization, various methods of lime and bitumen stabilization.

Course Outcomes:

The student should be able to know:

CO1 Various ground improvement techniques and their modifications, suitability, feasibility various methods in-situ densification of granular soils.
CO2 Various methods in-situ densification of cohesive soils, design of reinforced earth walls
CO3 The functions and applications of geotextiles, various methods of mechanical stabilization
CO4 Various methods of cement, lime and bitumen stabilization.

UNIT-I

1. **Introduction**

Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

2. **In-situ densification methods in granular soils**

Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth.

UNIT-II

3. **In-situ densification methods in cohesive soils**

Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.

4. **Reinforced earth**

Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT-III

5. Geotextiles

Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids

and its functions.

6. **Mechanical Stabilization**

Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control.

UNIT-IV

7. Cement Stabilization

Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.

8. Lime and Bituminous Stabilization

Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

TEXT BOOK

1. HausmannM.R(1990) Engineering Principles of ground modification, McGraw-Hill International edition.

REFERENCES

1. Ground improvement Techniques, P.PurushothamaRaju, Laxmi Publications Pvt. Ltd., New Delhi.
2. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA.
3. Construction and Geotechnical methods in Foundation Engineering, R.M.Koerner, McGraw-Hill Book Company.
4. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International BookTraders, New Delhi.

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Elective - VI

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
IV B.Tech – II Semester (Code : 18CED61)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives

- Understand the basic concepts of structural dynamics under free vibration and forced vibration.
- Know the geo technical factors which are affecting the earthquake engineering.
- Analysis of buildings subjected to earthquake forces by using equivalent static method as per the IS:1893 – 2016
- Design and Detailing of buildings as per IS: 13920 – 1993 and few concepts of masonry structures to make earthquake resistant.

Course Outcomes

CO1 Understand the bahavior of structures subjected to free and forced vibration of single degree of freedom systems.
CO2 Learning earthquake engineering fundamentals and elements of Geo-technical engineering such as liquefaction and slope stability analysis.
CO3 Analysis of single storey and single bay RCC plane frames subjected to lateral forces.
CO4 Design of single storey and single bay RCC plane frames and its sub parts like beam, column, footing and Detailing as per IS: 13920 – 1993.

UNIT-I

1) Elements of structural dynamics Sources of vibrations; Types of vibrations; Degrees of freedom; Spring action and damping; Free vibration of undamped system having single degree of freedom; Free vibration of viscous damped system having single degree of freedom; Forced vibration of a viscous damped single degree freedom system subjected to harmonic excitation; Earthquake excitation (Base excitation) of a single degree freedom system.

UNIT-II

2) Elements of Earth Quake Ground motion

Earthquake size- Intensity and magnitude; Seismic Zoning-Introduction; Strong Motion Earthquakes - Introduction; Response spectrum (elastic); Local site effect (Effect of type of soil).

3) Elements of GeotechnicalEarthquake Engineering

Liquefaction – Definition and types, Effect of liquefaction on built environment, Evaluation of liquefaction susceptibility, Liquefaction hazard mitigation Seismic slope stability – Introduction, Pseudo-static analysis, Sliding block methods

UNIT III

4) Analysis of single storey and single bay RCC Plane Frame (Columns vertical) : (As per IS:1893(part-I)-2016) Calculation of lateral force due to earthquake using equivalent static method ; Analysis for different load combinations; Design forces and moments in beam and columns.

UNIT-IV

5)Design of single storey and single bay RCC plane frames (Columns vertical)(As per IS:456-2000 and IS13920-2016) Design of column; Design of beam; Design of footing ; Detailing of entire frame

6) Masonry Structures

House types and damages, cause and location of damage, Understanding the knowledge hidden in your existing houses, Making houses earthquake resistant, Earthquake resistant features, Retrofitting-some examples, Technology choice, summary of earthquake resistant features, improving housing designs.

CODE BOOKS

IS:1893(part-I)-2016, IS13920-2016, IS:456-2000, SP16

TEXT BOOKS

1. Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh Chandra, Second Edition(1994), South Asian Publishers, New Delhi.
2. Geotechnical Engineering - S.K.Gulati & ManojDatta, Tata McGraw-Hill Publishing Company Ltd.
3. Earthquake Resistant Design of Structures by PankajAgarwal, Manish Shrikhande , First edition(2006), Prentice Hall of India Private Ltd., New Delhi .
4. Earthquakes and Buildings – A.S.Arya, A.Revi, Pawan Jain

REFERENCE BOOK

1) Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
CO1	3	2	1	-	-	2	-	-	-	-	-	-	3	1	-	-
CO2	3	2	1	-	-	3	-	-	-	-	-	-	3	2	-	-
CO3	2	3	2	-	-	1	-	-	-	-	-	-	3	1	-	-
CO4	2	3	3	-	-	1	-	-	-	-	-	-	3	1	-	-

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Elective - VI

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT
IV B.Tech – II Semester (Code : 18CED62)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives

- To be introduced to environmental impact assessment and explain the components and decision-making processes involved in environmental assessment.
- To introduce the various methodologies used in EIA
- To introduce the Methodology for the assessment of soil, water, air and biological environment
- To introduce environmental auditing procedure and relative legislation.

Course Outcomes:

CO1 The students will be able to assess the impact on the environment of various Environmental management techniques.
CO2 The students will be able to analyze the impact on environment due to some new Developmental activities.
CO3 Identify the Concepts on various environmental impact assessment methodologies.
CO4 Knowledge on environmental auditing procedure assessment of environmental impacts due to developmental activities.

UNIT – I

Basic concept of EIA

Definition, Initial environmental Examination, Elements of EIA,-factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT – II

E I A Methodologies:

Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method, Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT – III

E I A in soil, surface water, Air and Biological environment

Introduction and Methodology for the assessment of soil and ground water, Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and incorporation of mitigation measures

Methodology for the assessment of Impacts on surface water environment, Air pollution sources, generalized approach for assessment of Air pollution Impact.

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT – IV

Environmental Audit & Environmental legislation

Objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report. The Environmental pollution Act, The water; Act, The Air (Prevention & Control of pollution Act.), Mota Act. Wild life Act. Case histories of application of any construction industries.

REFERENCES/TEXT BOOKS:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, KAKINADA.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
3. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K., Katania &Sons Publication, NewDelhi.
4. EnvironmentalPollutionandControl,byDrH.S.Bhatia–GalgotiaPublication(P)Ltd,Delhi

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Elective - VI

PAVEMENT ANALYSIS AND DESIGN
IV B.Tech – II Semester (Code : 18CED63)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Prerequisites: Soil Mechanics (18CE506) Highway Engineering (18CE604)

Course Objectives:

- To discuss the Variables Considered in Pavement Design.
- To discuss the various stresses induced in pavements.
- To assess the properties of materials and mixes.
- To design the flexible and rigid pavements.

.

Course Outcomes: Student will be able to

CO1 Assess the factors Considered in Pavement Design.
CO2 Analyse the stresses induced flexible and rigid pavements.
CO3 Characterize the response characteristics of soil, aggregate, asphalt, and asphalt mixes.
CO4 Determine the crust thickness of the flexible and rigid pavement.

UNIT – I

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT – II

Stresses in Pavements: Stress Inducing Factors in Flexible and Rigid pavements. Stresses in Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two- and Three-Layered Systems, Fundamental Design Concepts. Stresses In Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars

UNIT – III

Material Characteristics: Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilization and Use of Geo Synthetics.

UNIT – IV

Design of Pavements: Flexible Pavement Design by IRC Method, Concepts of Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO.
Rigid Pavements: IRC Method of Design, Concepts of PCA & AASHTO method.
Pavement design for low volume roads, rural road designs – code of practice.
Design of Overlays: Types of Overlays, Suitability, Design of overlays.

TEXTBOOKS AND REFERENCE BOOKS:

1. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc
2. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros.
3. Relevant codes from Indian Roads Congress (IRC:37-2018)for design of Flexible and Rigid Pavements(IRC:58-2015) and overlay design, Bureau of Indian standards (BIS), Ministry of Road Transport and Highways (MoRTH-2013), and Asphalt Institute Manuals (AI).

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Elective - VI

TOWN PLANNING AND ARCHITECTURE
IV B.Tech – II Semester (Code : 18CED64)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To discuss the history of architecture and design.
- To discuss the historical background of town planning
- To discuss the planning theory and principles of planning.
- To discuss development of smart cities

.

Course Outcomes:

Student will be able to

CO1 Understand the history of architecture and design.
CO2 Understand the historical background of town planning
CO3 Understand the planning theory and principles of planning
CO4 Understand the development of smart cities

UNIT–I

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures. Indian Architecture: Vedic age, Indus valley civilization Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas Hindu temples: Dravidian and Indo Aryan Styles Temple of Aihole, Madurai, Bhuvaneshwar, MountAbu. IndoSarsanic(Islamic)Architecture: Mosque -Palace - Fort-Tomb.

Architectural Design:

Principles of designing–Composition of Plan relationship between plan and elevation building elements, form, surface texture, mass, line, color, tone, Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character and expression.

UNIT–II

Historical Back Ground of Town Planning: Town planning in ancient- medieval, renaissance, industrial and post-industrial cities; Contribution of individuals to city planning-Lewis Mumford, Patric Geddes, Peter Hall etc; Acropolis(Greece), Jerusalem, Mecca, Rome, London.

Town planning in India–Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjo-Daro, Pataliputra, Delhi, Chandigarh etc;

UNIT–III

Planning Theory: Theories of urbanization including Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and other latest theories, Land use and land value theory of William Alonso; Ebenezer Howard's Garden City Concept; Green Belt Concept.

Principles of Planning: Principles of planning a residence-site selection, site orientation-aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors. Types of Development Plans.

UNIT–IV

Building Systems: HVAC, Acoustics, Lighting; LEED ratings;
Development of Smart cities: Definition, introduction, fundamentals, possible systems required for a typical Smart City, Case studies.

TEXTBOOKS:

1. 'The great ages of World Architecture' by G.K. Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture'byY. S. Sane.
3. 'Professional Practice' by G.K.Krishnamurthy, S.V.Ravindra, PHILearning, NewDelhi.
4. 'Indian Architecture–Vol.I&II' by Percy Brown, Taraporevala Publications, Bombay.
5. 'Fundamentals of Town Planning'byG.K. Haraskar.

REFERENCES:

1. 'Drafting and Design for Architecture by Hepler, Cengage Learning
2. 'Architect's Portable Handbook' by John Patten Guthrie–McGraw Hill International Publications.
3. 'Mordern Ideal Homes for India' by R.S. Deshpande.
4. 'Town and County Planning' by A.J.Brown and H.M.Sherrard.
5. 'Town Design' by Federik Glbbard, Architectural press, London.