Syllabus of I & II Semesters B.E./B.Tech.

Common to all Engineering Branches

(with effect from 2015-16)

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BOS member.

Visvesvaraya Technological University, Belgavi

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CHOICE BASED CREDIT SYSTEM (CBCS)
REGULATIONS GOVERNING
THE DEGREE OF BACHELOR OF ENGINEERING / TECHNOLOGY
(B.E./B.Tech.)

DEFINITIONS OF KEY WORDS:

1. **University:** Visvesvaraya Technological University, Belagavi.
2. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
3. **Semester:** Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from August to January and even semester from February to July.
4. **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses *(core, elective and Foundation Courses).*
5. **Credit Based Semester System (CBSS):** Under the CBSS, the requirement for awarding a degree or certificate is prescribed in terms of number of credits to be earned by the students.
6. **Programme:** An educational programme leading to award of a Degree or certificate.
7. **Course:** Usually referred to, as 'papers' is a component of a programme. All courses need not carry the same weightage. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.
8. **Branch:** Specialization or discipline of B.E./B.Tech. Degree Programme, like Civil Engineering, Textile Engineering, etc.
9. **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.
10. **Grade Point:** It is a numerical weightage allotted to each letter grade on a 10-point scale.
11. **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
12. **Credit Point:** It is the product of grade point and number of credits for a course.
13. **Semester Grade Point Average (SGPA):** It is a measure of academic performance of student/s in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

14. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points earned by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

15. **First Attempt:** If a student has completed all formalities and become eligible to attend the examinations and has attended at least one head of passing, such attempt (first sitting) shall be considered as first attempt.

16. **Transcript or Grade Card or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses.

Sequencing Plan for the B.E. / B.Tech. Degree Curriculum

Semesters	*Course Coverage*
I –II	HSS, BS and ES; Common for all Branches; Mandatory Courses
III-IV	BS Common for all Branches and ES; PS – Core/Elective
V-VII	PS- Core & Electives; Other Electives; Branch-wise Orientation
VIII	PS-Electives/Elective ; Other Electives, Internship, Project work

Abbreviations:

HSS - Humanities and Social Sciences

BS - Basic Sciences

ES - Engineering Sciences

PS - Professional Subjects

Credit Structure for Course Work

Lectures (hrs/wk/Sem)	Tutorial (hrs/wk/Sem)	Lab. Work (hrs/wk/Sem)	*Credits* (Lec:instruction:Lab)	*Credits* (Total)
4	0	0	4:0:0	4
3	0	0	3:0:0	3
0	1	2	0:1:2	2

CHOICE BASED CREDIT SYSTEM (CBCS)
REGULATIONS GOVERNING
THE DEGREE OF BACHELOR OF ENGINEERING / TECHNOLOGY
(B.E./B.Tech.)

15OB 1 **TITLE AND DURATION OF THE PROGRAMME OF STUDY**

15OB 1.1 The program of study shall be called the degree Program of study in Bachelor of Engineering / Technology, abbreviated as B.E. / B.Tech.

15OB 1.2 The program shall be of four academic years duration divided into eight semesters, each semester having duration of 16 weeks. For evening courses the contact hours are to be satisfied by working extra on afternoons of Saturdays and Sundays.

15OB 1.3 The calendar of events in respect of the program of study shall be fixed by the University from time to time.

15OB 1.4 The examination in all programs of study shall be conducted at the end of each semester for all eight semesters.

15OB 2 **ELIGIBILITY FOR ADMISSION**
(The Government orders issued from time to time in this regard shall prevail).

15OB 2.1 Admission to I year / I semester Bachelor Degree in Engineering / Technology shall be open to the students who have passed the second year Pre-University or XII standard or equivalent examination recognized by the University.
For the prerequisite qualification earned from foreign countries, Equivalence certificate from the Association of Indian Universities is Mandatory.
The decision of the Equivalence committee shall be final in establishing the eligibility of student.

15OB 2.2 In addition to 15OB 2.1, the student shall have secured not less than forty five percent (45%) marks in the aggregate with Physics and Mathematics as compulsory subjects, along with any one of the following subjects, namely, Chemistry, Bio-Technology, Computer Science, Biology and Electronics or as decided by the Government of Karnataka.
Provided that, the minimum marks for the purpose of eligibility shall be forty percent (40%) in optional subjects in case of students belonging to SC/ST and OBC students from Karnataka or as decided by the Government of Karnataka.

Provided further that, the student shall have studied and passed

English as one of the subjects.

15OB 2.3 Admission to II year/ III semester Bachelor Degree in Engineering/ Technology (Lateral Entry) shall be open to the students

Diploma Holders

- Must have passed diploma or equivalent qualification as recognized by University and secured not less than forty five percentage (45%) marks in the final year examination (fifth and sixth semesters) in the appropriate branch of engineering. In case of SC/ST and OBC students from Karnataka the minimum marks for eligibility shall be forty percent (40%).

- Who have completed their Diploma from other than Karnataka state shall provide the Equivalence/ Eligibility Certificate from the Director of Technical Education, Karnataka.

- Who are seeking admission under lateral entry shall also clear prescribed Bridge courses (Advanced Mathematics – III and IV) and Mandatory subjects (CPH and CIV) as specified by the University.

B.Sc. Graduates

- **Must have** passed B.Sc. degree from a recognized University as defined by the UGC or equivalent qualification as recognized by University and secured not less than forty five percentage (45%) marks in aggregate (including all six semesters). In case of SC/ST and OBC students from Karnataka the minimum marks for eligibility shall be forty percent (40%). Should have studied Mathematics as subject of study at XII Standard.

- Further, all the B.Sc. students seeking admission to lateral entry shall also clear the following subjects before entering into V Semester
  I. Computer Aided Engineering Drawing (CAED) and
  II. Programming in C and Data Structures
  III. CPH and CIV (if not studied at B.Sc. Level).

15OB 2.4 Admission to Evening Programme of study shall be open to a student;
Who on the first day of the term notified by the University for the year of admission has at least one-year professional experience in the branch of engineering / technology, in which the student holds a diploma.

Explanation: Professional experience means employment on regular basis

a. in Government, Government undertaking, Public Sector undertaking, Corporations or
b. in a private company registered under the Directorate of Industries and Commerce or the Directorate of Small Scale Industries or
c. In Government, Government recognized institutions as technical staff.

Provided that the period of apprenticeship undergone shall also be treated as professional experience, if sponsored by the Board of Apprenticeship Training, Southern Region Chennai or by any Government, Government undertaking or Public Sector undertaking.

Provided further that employment shall be in an establishment situated within the urban agglomeration of city in which the professional institution is situated.

15OB 2.5 Those students, who have passed a qualifying examination other than the PUC II examination of the Pre-University Education Board of Karnataka, have to obtain eligibility certificate for seeking admission to B.E./B.Tech. Degree Programme from Visvesvaraya Technological University, Belagavi or from the Principal of concerned Engineering College of Karnataka State.

15OB 3 ATTENDANCE REQUIREMENT

15OB 3.1 Each semester is considered as a unit and the student has to put in a minimum attendance of 85% in each Course with a provision of condonation of 10% of the attendance by the Vice-Chancellor on the specific recommendation of the Principal of the college where the student is studying, showing reasonable cause such as medical grounds, participation in University level sports, cultural activities, seminars, workshops, paper presentation, etc.

15OB 3.2 The basis for the calculation of the attendance shall be the number of hours prescribed by the University by its calendar of events. For the first semester students, the same shall be reckoned from the date of admission to the course as per CET allotment.

15OB 3.3 The students shall be informed about their attendance status periodically by the colleges so that the students shall be cautioned to make up the shortage. The Principals of the affiliated Colleges shall submit the list of students who have been detained for shortage of attendance by the end of the semester to the Registrar (Evaluation)

with a copy to the Registrar.
Provided that mere omission by the college to inform the student about the shortage of attendance shall not entitle him to appear for examination.

15OB 3.4 A student having shortage of attendance in one or more subjects shall have to repeat the whole semester and such students shall not be permitted to take admission to next higher semester.
Such students shall take readmission to the same semester in the subsequent academic year.

15OB 3.5 **TEMPORARY DISCONTINUATION OF THE PROGRAM:**
A student, who wishes to temporarily discontinue the program and continue the same subsequently, has to obtain prior permission from the University by applying through the Principal. Such students have to take readmission to the same semester/year in the subsequent academic year. However, the student shall complete the course as per 15OB 6.2.

15OB 4 INTERNAL ASSESSMENT MARKS

15OB 4.1 There shall be a maximum of 20 Internal Assessment Marks in each theory or practical paper. For seminars, the Internal Assessment marks shall be 50.

15OB 4.2 The Internal Assessment marks in a theory paper shall be based on two tests generally conducted at the end of 6^{th} and 12^{th} week of each semester. An additional test may be conducted for the desirous students before the end of the semester to give an opportunity to such students to improve their Internal Assessment Marks, subject to the provisions of 15OB 4.13. The test shall be answered in Blue Books with pages serially numbered. These blue books shall be kept in the custody of the Principal of the College until after one month from the date of announcement of the result by the University. These shall be made available to University authorities for verification as per the directions of the Registrar (Evaluation)/ Registrar.

15OB 4.3 Average of the better marks obtained from any two tests shall be the Internal Assessment Marks for the relevant subject.

15OB 4.4 If a student remains absent for all the Internal Assessment tests conducted, the Internal Assessment Marks shall be marked as AB for the subject against the University Seat Number (USN) of the student in the marks sheet submitted to the University by the Principal of the College.

15OB 4.5 In the case of a Practical, the IA marks shall be based on the laboratory journals/reports and one practical test.

15OB 4.6 i) The IA marks for I year Computer Aided Engineering / Drawing:
a) 12 marks for class work (sketching and Computer Aided engineering drawing).
b) 08 marks for test in the same pattern as that of the main examination (better of the two tests)
ii) The IA marks for other Drawings and Design Drawings offered by various branches shall be based on the evaluation of the sheets and one test in the ratio 60:40.

15OB 4.7 The IA marks in the case of projects and seminars in the final year shall be based on the evaluation at the end of 8^{th} semester by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the project / seminar guide.

15OB 4.8 The final list, incorporating corrections (if any) of IA marks awarded to the students in the Theory/Practical/Internship/Project work/ Seminar, shall be displayed on the notice board of the college at least seven days before the closure of the semester and a certified copy of the same shall be sent by the Principals to the University Examination Section within the stipulated date. Every page of the IA marks sheet shall bear the signatures of the concerned Teacher/Teachers, Head of the Department and Principal.

15OB 4.9 Any corrections or over writing of IA marks shall bear the signature(s) of concerned Teacher(s) and in such cases the Head of the Department shall on every sheet indicate the number of corrections and attest it with his signature.

15OB 4.10 (a) A student failing to secure a minimum of 50% of the IA marks in Practical/Internship/Project work shall not be eligible for the Practical /Internship/Project of the University examination.

15OB 4.10 (b) For seminars, the minimum requirement of IA marks shall be 40% of the maximum.

15OB 4.11 Such students as mentioned in 15OB 4.10 shall repeat the laboratory work/Internship/project work during the subsequent semester(s) and secure at least the minimum marks prescribed.

15OB 4.12 For theory subjects, there shall not be any minimum requirements of IA marks.

15OB 4.13 Improvement of IA marks shall not be allowed

a. In theory subjects and
b. In Laboratory/Workshop/Seminar/ Internship / Project where the student has already secured the minimum required marks.

15OB 4.14 IA marks of those students to whom 15OB 4.11 is applicable, shall be sent separately to the Registrar (Evaluation).

15OB 4.15 IA marks shall reach the University before the commencement of examination as per the notification from the office of the Registrar (Evaluation) from time to time. After the submission of Internal Assessment marks to the University, any request for change of IA marks shall not be considered under any circumstances.

15OB 5 **ELIGIBILITY FOR PASSING**

A student who obtained Grades O to E shall be considered as passed and if a student secured "F" grade in any of the head of passing he /she has to reappear for the examination.

15OB 5.1 (a) For a pass in a theory subject/drawing, the student shall secure minimum of 35% of the maximum marks prescribed in the University examination and 40% of marks in the aggregate inclusive of the IA marks. i.e. Minimum Passing Grade is "E".

15OB 5.1 (b) For a pass in a Practical/Internship/Project/Viva-voce examination, a student shall secure a minimum of 40% of the maximum marks prescribed for the University Examination in the relevant Practical/Internship/Project/Viva-voce. i.e. Minimum Passing Grade in a course is "E".

15OB 5.1 (c) For a pass in Seminar, a student shall secure a minimum of 40% of the maximum marks prescribed. i.e. Minimum Passing Grade is "E".

15OB 5.2 The students who do not satisfy the condition 15OB 5.1 and the student who remains absent shall be deemed to have failed in that subject and may reappear for the University examination in the subsequent examinations. However, the IA marks awarded to the student/s at first attempt in the concerned theory subject will be carried forward. In case of Practical/Internship/Projects/Seminar revised marks will be taken as per regulations 15OB 4.10 (a & b) and 15OB 4.11.

15Ob 5.3 The student who passes a course of a semester as per 15OB 5.1 shall not be allowed to appear for the same again, unless he/she opts for rejection of results as per 15OB 5.4, 5.5, 5.6, 5.7 & 5.8.

OB 5.4 A student may, at his/her desire, reject his/her total performance of a semester (including IA marks) or he/she may reject the result of his/her performance in University examination of a semester only. The rejection is permitted only once during the entire course of study.

15OB 5.5 The student who desires to reject the performance as per 15OB 5.4 shall reject performance in all the courses of the semester, irrespective of whether the student has passed or failed in any subject. However, the rejection of performance of 8th semester project result shall not be permitted.

15OB 5.6 A student, who desires to reject the total performance of the semester including Internal Assessment, has to take readmission for the relevant semester. Application for such readmission shall be sent to the Registrar through the Principal of College within 30 days from the date of the announcement of the results. Late submission of application shall not be accepted for any reasons. Readmission to First semester in such cases shall not be considered as fresh admission i.e., the student will continue to have the same University Seat Number, which was allotted earlier. The course duration permitted (as per 15OB 6) will be counted as per old USN.

OB 5.7 The student, who desires to reject only the results of University examination of a semester and does not desire readmission, shall be permitted to re-appear for examinations of all the subjects of the semester in the subsequent examinations. However, the IA marks obtained by the student in the rejected semester shall be retained. Applications for such rejection shall be sent to the Registrar (Evaluation) through the Principal of the College within 30 days from the date of announcement of the results. Late submission of applications shall not be accepted for any reasons.

If the rejection of the University examination results of the semester happens to be of the odd semester, the student shall be allowed to take admission to the immediate next even semester. However, if the rejection of the University result is of the even semester, the student shall not be allowed to take admission to the next odd semester (as per 15OB 7.2).

15OB 5.8 Such students who opt for rejection at final year are eligible for the award of class and distinction at the B.E./ B.Tech. degree level, but are not eligible for the award of ranks.

15OB 5.9 A student shall be declared to have completed the program of B.E./ B.Tech., degree, provided the student has undergone the stipulated course work as per the regulations and has earned at least 200 Credits.

15OB 6 MAXIMUM DURATION FOR COURSE COMPLETION

15OB 6.1 A student who has not obtained the eligibility for third semester after a period of three academic years from the date of first admission shall discontinue the course. However, the student is eligible for readmission for first year B.E./B.Tech. in respective College of the University and he/ she shall be allotted a University Seat Number (USN) without any change in the year of admission in the USN but the serial number of the student shall start with six hundred (6XX) series in the same branch.

15OB 6.2 The student admitted to 1st year B.E/ B.Tech. shall complete the course within a period of eight academic years from the date of first admission, failing which he/she has to discontinue the course.

The students admitted under lateral entry scheme (2nd Year B.E./B.Tech.) shall complete the course within a period of six academic years from the date of first admission, failing which he/she has to discontinue the course.

15OB 7 PROMOTION AND ELIGIBILITY FOR THE EXAMINATIONS

15OB 7.1 There shall not be any restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement.

15OB 7.2 A student shall be eligible for promotion from an even semester to the next odd semester (i.e. of the next academic year) if the student has not failed in more than four heads of passing of the immediately preceding two semesters and has passed in all the subjects of all the lower semester examinations. A theory or practical shall be treated as a head of passing.

Illustrations

a. A student seeking eligibility to 3rd semester should not have failed in more than 4 heads of passing of first and second semesters taken together.

b. A student seeking eligibility to 5th semester should have passed in all the subjects of 1st and 2nd semesters and should not have failed

in more than 4 heads of passing of third and fourth semesters taken together.

c. A student seeking eligibility to 7th semester should have passed in all the subjects up to 4th semester and should not have failed in more than 4 heads of passing of 5th and 6th semesters taken together.

The Subjects:
1. Constitution of India, Professional Ethics and Human Rights, and
2. Environmental Studies

are Mandatory Non-Credit Courses; these subjects shall not be considered for the Eligibility for promotion, award of Class, calculation of SGPA and CGPA. However, a pass in the above subjects is mandatory before the completion of Degree.

15OB 8 COURSES

15OB 8.1 There will be Four types of courses

(i) Core Courses: This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirements of a program in a said discipline of study. These courses will have 4 credits per course.

(ii)Foundation Courses: The Foundation Courses are of two kinds: *Compulsory Foundation* and *Elective foundation.*

"Compulsory Foundation": These courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines. These courses will have 4 credits per course.

"Foundation Electives": These are value based courses aimed at man making education. These courses will have 3 credits per course.

(iii)Elective Courses: This is course, which can be chosen from the pool of papers. It may be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student proficiency skills. These courses will have 3 credits per course.

(iv)Mandatory Non-Credit Courses: These courses are mandatory for students joining B.E./B.Tech. Program and students have to successfully complete these courses before the completion of degree.

15OB 8.2 The minimum number of students to be registered for an Elective to be offered shall be not less than ten.

15OB 8.3 A student shall exercise his option in respect of the electives and register for the same at the beginning of the concerned semester. The student may be permitted to opt for change of elective subject within 15 days from the date of commencement of the semester as per the calendar of the University.

15OB 9 INTERNSHIP

15OB 9.1 **Internship:** The student shall undergo an Internship for 8 weeks i.e. starting from the end of 7th semester Examination after availing one week vacation and completing during the initial period of 8th semester.

1. The college shall nominate a faculty for a group of students to prepare the students for internship.
2. The students shall report the progress of the internship to the guide in regular intervals and may seek his/her advise.
3. The Internship shall be completed between 7th and 8th semesters.
4. After completion of 7th semester Theory and Practical examinations, the students shall have one week vacation.
5. Immediately after availing one week vacation, the students shall undergo internship (without waiting for the results) which may be a period of 4/5 weeks.
6. The remaining period of internship; i.e. 4/3 weeks shall be completed during the initial period of the 8th semester.
7. After completion of Internship, students shall submit a report to the college with the approval of both internal and external guides.
8. There will be 50 IA and 50 External marks for Internship.
9. The guide shall be the internal examiner and IA marks out of 50 are to be awarded by the internal guide after evaluating the Internship Report submitted by the student.
10. Viva-Voce on internship shall be conducted at the college and the date of Viva-Voce shall be fixed in consultation with the external Guide.

11. Viva-Voce on internship shall be conducted by both internal and external guides and jointly evaluate the internship report for 50 marks. The expenses of external guide are to be borne by the student/college.
12. In case of the non availability of external guide for the conduct of viva-voce, the Principal shall appoint a senior faculty of the department to conduct viva-voce along with the internal guide, and they jointly evaluate the internship report for 50 marks.
13. The students are permitted to carry out the internship outside India with the following conditions:
14. The entire expenses are to be borne by the student or college and the University will not give any financial assistance.
15. The Internal Guide has to visit at least once during the student's internship; the expenses of the visit are to borne by the student/college.
16. The external guide from the industry has to be an examiner for the viva voce on Internship, and the expenses are to be borne by the student/ college.
17. The University will not provide any kind of Financial Assistance to any student for internship and for the conduct of Viva-Voce on internship.

15OB9.2 **Report on Internship**: The College shall facilitate and monitor the student internship program. The internship report of each student shall be submitted to the Head of the Department of the college with the approval of the Guide.

15OB9.3 **Failing to undergo Internship:** Completion of internship is mandatory; if any student fails to complete internship, he/she will not be eligible for the award of degree.

15OB9.4 **Non-completion of Internship**: In such cases, the student has to redo the internship.

15OB 10 SEMINAR AND PROJECT

15OB 10.1 Seminar topic shall be selected from the emerging technical areas only.

15OB 10.2 Project work at 8th semester shall be completed batch wise, each batch consisting of minimum of two students and maximum four students.

15OB 10.3 Viva-voce examination in project work shall be conducted batch-wise.

15OB 11 COMPUTATION OF SGPA AND CGPA

i. The VTU adopts absolute grading system wherein the marks are converted to grades, and every semester results will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated every semester, except the first semester.

ii. The grading system is with the following letter grades as given below:

Grades and Grade Points

Level	Out-standing	Excel lent	Very Good	Good	Above Average	Average	Poor	Fail
Letter Grade	O	S	A	B	C	D	E	F
Grade Points	10	9	8	7	6	5	4	00

iii. A student obtaining Grade "F" shall be considered failed and will be required to reappear in the examination.

Such students after passing the failed subject in subsequent examination/s will be awarded with "E" grade irrespective of marks he/she scores in the subsequent examination/s.

Number of attempts taken to clear a subject/s shall be shown in the transcripts.

Grade Points Scale

Computation of SGPA and CGPA

Level	Out-standing	Excellent	Very Good	Good	Above Average	Average	Poor	Fail
Letter Grade	O	S	A	B	C	D	E	F
Grade Points	10	9	8	7	6	5	4	00
Score (Marks) Range (%)	≥ 90	<90 ≥ 80	< 80 ≥70	< 70 ≥60	< 60 ≥50	< 50 ≥45	<45 ≥40	< 40

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

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

$$\textbf{SGPA (Si)} = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\textbf{CGPA} = \sum(Ci \times Si) / \sum Ci$$

where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

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

Computation of SGPA

Illustration No.1

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	4	A	8	4x8 = 32
Course 2	4	C	6	4x6 = 24
Course 3	4	B	7	4x7 = 28
Course 4	3	O	10	3x10= 30
Course 5	3	D	4	3x4 = 12
Course 6	3	C	6	3x6 = 18
Course 7	2	S	9	2x9 = 18
Course 8	2	C	6	2x6 = 12
	25			**174**

Thus, **SGPA= 174/25=6.96**

Illustration No.2

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	4	A	8	4x8 = 32
Course 2	4	C	6	4x6 = 24
Course 3	4	B	7	4x7 = 28
Course 4	3	O	10	3x10= 30
Course 5	3	F	0	3x0 = 00
Course 6	3	C	6	3x6 = 18
Course 7	2	S	9	2x9 = 18
Course 8	2	C	6	2x6 = 12
	25			**162**

Thus, **SGPA= 162/25=6.48**

Illustration No.2(a)

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 5	3	E	4	3x4 =12
	25			Ci (First Attempt)162 + Ci (subsequent attempt) 12= 174

Thus, **SGPA= 174/25=6.96**

Illustration No.3

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	4	A	8	4x8 =32
Course 2	4	C	6	4x6 =24
Course 3	4	B	7	4x7 =28
Course 4	3	O	10	3x10=30
Course 5	3	S	9	3x9 =27
Course 6	3	C	6	3x6 =18
Course 7	2	S	9	2x9 =18
Course 8	2	C	6	2x6 =12
	25			**189**

Thus, **SGPA= 189/25=7.56**

$$\text{CGPA}= \frac{25x6.96+25x7.56}{50} = 7.26$$

CGPA after Final Semester

Sem-1	Sem-2	Sem-3	Sem-4	Sem-5	Sem-6	Sem-7	Sem-8
Credit: 24 SGPA: 7	Credit: 24 SGPA: 8.5	Credit: 27 SGPA: 9.2	Credit: 27 SGPA: 6.86	Credit: 24 SGPA: 8.18	Credit: 24 SGPA: 7.73	Credit: 24 SGPA: 8.68	Credit: 26 SGPA: 9.4

Thus,**CGPA**= $\frac{24x7+24x8.5+27x9.2+27x6.86+24x8.18+24x7.73+24x8.68+26x9.4}{200}$ **= 8.2**

Transcript (Format): Based on the above recommendations on Letter grades, grade points, SGPA and CCPA, the transcript for each semester and a consolidated transcript indicating the performance in all semesters may be issued.

15OB 12 **CONVERSION OF GRADES INTO PERCENTAGE:**

Conversion formula for the conversion of GPA into Percentage is [CGPA Earned - 0.75] x 10= Percentage of marks scored.

Illustration: [CGPA Earned 8.2 - 0.75]x 10 = 74.5%

15OB 13 **AWARD OF PRIZES, MEDALS & RANKS**

15OB 13.1 For the award of Prizes and Medals, the conditions stipulated by the Donor may be considered subject to the provisions of the statutes framed by the University for such awards.

15OB 13.2 For award of ranks in a branch, a minimum of 10 students should have appeared in the 8th semester examination. The total number of ranks awarded shall be 10% of total number of students appeared in 8th semester or 10 students, whichever is less in that branch.

Illustration:

1. If 1028 students appeared for the 8th semester in Electronics and Communication Engineering Branch, the number of ranks to be awarded for Electronics and Communication Engineering will 10.
2. If 90 students appeared for the 8th semester in Biomedical Engineering Branch, the number of ranks to be awarded for Biomedical Engineering will be 09.

15OB13.3 For award of rank in a branch of Engineering / Technology, the CGPA secured by the student from

a) 1st to 8th semester for the students admitted to B.E./B.Tech. Program from 1st year, and

b) 3rd to 8th semester for the students admitted to B.E./B.Tech. Program from 2nd year (Lateral Entry)

shall be considered.

A student shall be eligible for a rank at the time of award of degree in each branch of Engineering / Technology, provided the student

a. Has passed 1st to 8th (students joining from 1st semester) or 3rd to 8th (in case of lateral entry) semester in all the subjects in first attempt only

b. Has not repeated/rejected any of the lower semesters.

15OB13.4 If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA*; but, if it is not resolved even at this stage, the number of times a student has obtained higher grades like O, S, A, B etc shall be taken into account in rank ordering of the students in a program.

15OB 14 TRANSFER OF STUDENTS

15OB14.1 Transfer of students from one college to another college within Karnataka state shall be permitted only at the beginning of third, fifth, and seventh semesters, subject to availability of seats within the permitted intake in respective Colleges and subject to the prior approval of the University and the provisions of 15OB 7.2.

In the case of students from Universities other than VTU the students should have passed in all the courses of 1st & 2nd semesters for admission to 3rd semester and all the courses of 1st to 4th semesters for admission to 5th semester and all the courses of 1st to 6th semesters for admission to 7th semester.

The students seeking admission from Universities other than VTU shall have to

a. apply for establishment of equivalence with prescribed fees as notified by the VTU and

b. Obtain No Objection for admission from the university before commencement of term as notified by VTU.

15OB14.2 Transfer of students within the College from one branch to another branch at 3rd semester shall be permitted with the prior approval of the VTU and subject to the provisions made by the Government of Karnataka and AICTE in this behalf.

15OB14.3 The University may prescribe fee for administrative purpose (for updating of the records), which shall be notified from time to time, for transfer from one college to another (Change of College) or one branch to another branch (change of branch within the college).

NOTE: These regulations governing the Degree of Bachelor of Engineering/Technology of Visvesvaraya Technological University shall be binding on all and may be modified from time to time.

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2015-2016

I SEMESTER B.E./B.TECH.

PHYSICS GROUP

Sl. No.	Subject Code	Subject		Teaching Department	Board	Theory /Lab/ Drawing (Hrs/ Week)	Examination Marks			Credits
							Th./Pr.	I.A.	Total	
1	15MAT11	Engineering Maths-I	BS	Maths	Basic Sc.	4 (T)	80	20	100	4
2	15PHY12	Engineering Physics	BS	Physics	Basic Sc.	4 (T)	80	20	100	4
3	15CIV13	Elements of Civil Engg. & Mechanics	ES	Civil Engg.	Civil Engg.	4 (T)	80	20	100	4
4	15EME14	Elements of Mechanical Engg.	ES	Mech. Engg.	Mech. Engg.	4 (T)	80	20	100	4
5	15ELE15	Basic Electrical Engg.	ES	E & E	E & E	4 (T)	80	20	100	4
6	15WSL16	Workshop Practice	ES	Mech., Auto, IP, IEM, Mfg. Engg.	Mech. Engg.	3(2 hrs lab+ 1 hr instruction)	80	20	100	2
7	15PHYL17	Engg. Physics Lab	BS	Physics	Basic Sc.	3(2 hrs lab+ 1 hr instruction)	80	20	100	2
8	15CPH18	Constitution of India, Professional Ethics and Human Rights (CPH)	MNC	Humanities		2 (Tutorial)	40	10	50	--
9		Language (Kan.)	Mandatory Learning	Humanities		1 (T)	-	-	-	--
						29	600	150	750	24

Note: The Subjects Kannada and English are Audit Courses

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2015-2016

II SEMESTER B.E./B.TECH.

PHYSICS GROUP

Sl. No.	Subject Code	Subject		Teaching Department	Board	Theory /Lab/ Drawing (Hrs/ Week)	Examination Marks			Credits
							Th./Pr.	I.A.	Total	
1	15MAT21	Engineering Maths-II	BS	Maths	Basic Sc.	4 (T)	80	20	100	4
2	15PHY22	Engineering Physics	BS	Physics	Basic Sc.	4 (T)	80	20	100	4
3	15CIV23	Elements of Civil Engg. & Mechanics	ES	Civil Engg.	Civil Engg.	4 (T)	80	20	100	4
4	15EME24	Elements of Mechanical Engg.	ES	Mech. Engg.	Mech. Engg.	4 (T)	80	20	100	4
5	15ELE25	Basic Electrical Engg.	ES	E & E	E & E	4 (T)	80	20	100	4
6	15WSL26	Workshop Practice	ES	Mech., Auto, IP, IEM, Mfg. Engg.	Mech. Engg.	3(2 hrs lab+ 1 hr instruction)	80	20	100	2
7	15PHYL27	Engg. Physics Lab	BS	Physics	Basic Sc.	3(2 hrs lab+ 1 hr instruction)	80	20	100	2
8	15CPH28	Constitution of India, Professional Ethics and Human Rights	MNC	Humanities		2 (Tutorial)	40	10	50	--
9		Language (Kan.)	Mandatory Learning	Humanities		1 (T)	-	-	-	--
						29	600	150	750	24

Note: The Subjects Kannada and English are Audit Courses

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2015-2016

I SEMESTER B.E./B.TECH.

CHEMISTRY GROUP

Sl. No.	Subject Code	Subject		Teaching Department	Board	Theory /Lab/ Drawing (Hrs/ Week)	Examination Marks			Credits
							Th./Pr.	I.A.	Total	
1	15MAT11	Engineering Maths-I	BS	Maths	Basic Sc.	4 (T)	80	20	100	4
2	15CHE12	Engineering Chemistry	BS	Chemistry	Basic Sc.	4 (T)	80	20	100	4
3	15PCD13	Programming in C & Data Structures	ES	Any Engineering Department	CSE	4 (T)	80	20	100	4
4	15CED14	Computer Aided Engineering Drawing	ES	Mech./IP/Auto/ Mfg.Engg./ IEM	Mech. Engg.	6 (2I+ 4P)	80	20	100	4
5	15ELN15	Basic Electronics	ES	E & C / E & E / TC / IT	E & C	4 (T)	80	20	100	4
6	15CPL16	Computer Programming Lab	ES	Any Engineering Department	CSE	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
7	15CHEL17	Engg. Chemistry Lab	BS	Chemistry	Basic Sci.	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
8	15CIV18	Environmental Studies	MNC	Civil / Environmental	Civil	2 (Tutorial)	40	10	50	--
9		Language (Eng.)	Mandatory Learning	Humanities		1 (T)	-	-	-	--
					Total	31	600	150	750	24

Note: The Subjects Kannada and English are Audit Courses

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2015-2016

II SEMESTER B.E./B.TECH.

CHEMISTRY GROUP

Sl. No.	Subject Code	Subject		Teaching Department	Board	Theory /Lab/ Drawing (Hrs/ Week)	Examination Marks			Credits
							Th./Pr.	I.A.	Total	
1	15MAT21	Engineering Maths-II	BS	Maths	Basic Sc.	4 (T)	80	20	100	4
2	15CHE22	Engineering Chemistry	BS	Chemistry	Basic Sc.	4 (T)	80	20	100	4
3	15PCD23	Programming in C & Data Structures	ES	Any Engineering Department	CSE	4 (T)	80	20	100	4
4	15CED24	Computer Aided Engineering Drawing	ES	Mech./IP/Auto/ Mfg.Engg./ IEM	Mech. Engg.	6 (2I+ 4P)	80	20	100	4
5	15ELN25	Basic Electronics	ES	E & C / E & E / TC / IT	E & C	4 (T)	80	20	100	4
6	15CPL26	Computer Programming Lab	ES	Any Engineering Department	CSE	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
7	15CHEL27	Engg. Chemistry Lab	BS	Chemistry	Basic Sc.	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
8	15CIV28	Environmental Studies	MNC	Civil / Environmental	Civil	2 (Tutorial)	40	10	50	--
9		Language (Eng.)	Mandatory Learning	Humanities		1 (T)	-	-	-	--
					Total	31	600	150	750	24

Note: The Subjects Kannada and English are Audit Courses

ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	: 15MAT11	**IA Marks**	: 20
Hours/Week	: 04	**Exam Marks**	: 80
Total Hours	: 50	**Exam Hours**	: 03
CREDITS	: 04		

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

- n^{th} derivatives of product of two functions and polar curves.
- Partial derivatives
- Vector calculus
- Reduction formulae of integration; To solve First order differential equations.
- Solution of system of linear equations, quadratic forms.

Module - 1

Differential Calculus -1:
determination of n^{th} order derivatives of Standard functions - Problems. Leibnitz's theorem (without proof) - problems.

Polar Curves - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms (without proof) -problems

10 - Hours

Module -2

Differential Calculus -2:
Taylor's and Maclaurin's theorems for function of one variable (statement only)- problems. Evaluation of Indeterminate forms.

Partial derivatives:
Definition and simple problems, Euler's theorem (without proof) problems, total derivatives, partial differentiation of composite functions- problems. Definition and evaluation of Jacobians

10 - Hours

Module – 3

Vector Calculus:
Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Definition of Gradient,

Divergence and Curl-problems. Solenoidal and Irrotational vector fields. Vector identities - div(ϕA), curl (ϕA), curl(grad ϕ), div(curl A).

10 - Hours

Module-4

Integral Calculus :
Reduction formulae - $\int Sin^n x\,dx, \int Cos^n x\,dx, \int Sin^m x\,Cos^n x\,dx$, (m and n are positive integers), evaluation of these integrals with standard limits (0 to $\pi/2$) and problems.

Differential Equations :
Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations. Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.

10 - Hours

Module-5

Linear Algebra :
Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss Jordan method and Gauss-Seidel method
Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. Linear transformation, diagonalisation of a square matrix. Reduction of Quadratic form to Canonical form

10 - Hours

Course outcomes :

On completion of this course, students are able to

- Use partial derivatives to calculate rates of change of multivariate functions.
- Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.
- Recognize and solve first-order ordinary differential equations, Newton's law of cooling
  Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.

Question paper pattern :

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be 2 full questions (with a **maximum of four** sub questions)

from each module.

- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books :

1. B.S. Grewal, **"Higher Engineering Mathematics"**, Khanna publishers, 42nd edition, 2013.
2. Erwin Kreyszig, **"Advanced Engineering Mathematics-I**, Wiley, 2013

Reference Books :

1. B.V. Ramana, **"Higher Engineering Mathematics"**, Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.
3. H.K. Dass and Er. RajnishVerma, **"Higher Engineerig Mathematics"**, S.Chand publishing, 1st edition, 2011.

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ENGINEERING PHYSICS

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	**: 15PHY12/15PHY22**	**IA Marks**	**: 20**
Hours/Week	**: 04**	**Exam Marks**	**: 80**
Total Hours	**: 50**	**Exam Hours**	**: 03**
CREDITS	**: 04**		

Course Objectives :

The Objective of this course is to make students learn and understand basic concepts and principles of physics to analyze practical engineering problems and apply its solutions effectively and meaningfully. To understand building up of models, design issues, practical oriented skills and problem solving challenges are the great task of the course. To know about shock waves and practical applications is the prime motto to introduce new technology at the initial stage of Engineering.

Module - 1

Modern Physics and Quantum Mechanics :

Black body radiation spectrum, Assumptions of quantum theory of radiation, Plank's law, Weins law and Rayleigh Jeans law, for shorter and longer wavelength limits. Wave Particle dualism, deBroglie hypothesis. Compton Effect. Matter waves and their Characteristic properties, Definition of Phase velocity and group velocity, Relation between phase velocity and group velocity, Relation between group velocity and particle velocity.

Heisenberg's uncertainity principle and its application, (Non-existence of electron in the nucleus).Wave function, Properties and physical significance of wave function, Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrodinger wave equation. Eigen values and Eigen functions. Application of Schrodinger wave equation for a particle in a potential well of infinite depth and for free particle

10 - Hours

Module – 2

Electrical Properties of Materials :

Free–electron concept (Drift velocity, Thermal velocity, Mean collision time, Mean free path, relaxation time). Failure of classical free electron theory. Quantum free electron theory, Assumptions, Fermi factor, density of states (qualitative only) Fermi–Dirac Statistics. Expression for electrical conductivity based on quantum free electron theory, Merits of quantum free electron theory.

Conductivity of Semi conducting materials, Concentration of electrons and holes in intrinsic semiconductors, law of mass action.

Temperature dependence of resistivity in metals and superconducting materials. Effect of magnetic field (Meissner effect). Type I and Type II superconductors–Temperature dependence of critical field. BCS theory (qualitative). High temperature superconductors. Applications of superconductors –. Maglev vehicles.

10 - Hours

Module - 3

Lasers and Optical Fibers :

Einstein's coefficients (expression for energy density). Requisites of a Laser system. Condition for laser action. Principle, Construction and working of CO_2 laser and semiconductor Laser. Applications of Laser – Laser welding, cutting and drilling. Measurement of atmospheric pollutants. Holography–Principle of Recording and reconstruction of images.

Propagation mechanism in optical fibers. Angle of acceptance. Numerical aperture. Types of optical fibers and modes of propagation. Attenuation, Block diagram discussion of point to point communication, applications.

10 - Hours

Module – 4

Crystal Structure :

Space lattice, Bravais lattice–Unit cell, primitive cell. Lattice parameters. Crystal systems. Direction and planes in a crystal. Miller indices. Expression for inter – planar spacing. Co-ordination number. Atomic packing factors (SC,FCC,BCC). Bragg's law, Determination of crystal structure using Bragg's X–ray difractometer. Polymarphism and Allotropy. Crystal Structure of Diamond, qualitative discussion of Pervoskites.

10 - Hours

Module - 5

Shock waves and Science of Nano Materials :

Definition of Mach number, distinctions between- acoustic, ultrasonic, subsonic and supersonic waves. Description of a shock wave and its applications. Basics of conservation of mass, momentum and energy. Normal shock equations (Rankine-Hugonit equations). Method of creating shock waves in the laboratory using a shock tube, description of hand operated Reddy shock tube and its characteristics.

Introduction to Nano Science, Density of states in 1D, 2D and 3D structures.

Synthesis : Top–down and Bottom–up approach, Ball Milling and Sol–Gel methods.

CNT – Properties, synthesis: Arc discharge, Pyrolysis methods, Applications.

Scanning Electron microscope: Principle, working and applications.

10 - Hours

Course outcomes :

On Completion of this course, students are able to –

- Learn and understand more about basic principles and to develop problem solving skills and implementation in technology.
- Gain Knowledge about Modern physics and quantum mechanics will update the basic concepts to implement the skills.
- Study of material properties and their applications is the prime role to understand and use in engineering applications and studies.
- Study Lasers and Optical fibers and its applications are to import knowledge and to develop skills and to use modern instruments in the engineering applications.
- Understand Crystal structure and applications are to boost the technical skills and its applications.
- Expose shock waves concept and its applications will bring latest technology to the students at the first year level to develop research orientation programs at higher semester level.
- Understand basic concepts of nano science and technology.

Question paper pattern :

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books :

1. Wiley precise Text, **Engineering Physics,** Wiley India Private Ltd., New Delhi. Book series – 2014,
2. Dr. M.N. Avadhanulu, Dr. P.G.Kshirsagar, **Text Book of Engineering Physics,** S Chand Publishing, New Delhi – 2012

Reference Books :

1. S.O.Pillai, **Solid State Physics, New** Age International. Sixth Edition.
2. Chintoo S Kumar ,K Takayana and K P J Reddy, **Shock waves made simple,** Willey India Pvt. Ltd. New Delhi,2014
3. A Marikani, **Engineering Physics,** PHI Learning Private Limited, Delhi - 2013
4. Prof. S. P. Basavaraju, **Engineering Physics,** Subhas Stores, Bangalore – 2
5. V Rajendran ,**Engineering Physics,** Tata Mc.Graw Hill Company Ltd., New Delhi – 2012
6. S Mani Naidu, **Engineering Physics,** Pearson India Limited - 2014

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ENGINEERING CHEMISTRY

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	**: 15CHE12/15CHE22**	**IA Marks**	**: 20**
Hours/Week	**: 04**	**Exam Marks**	**: 80**
Total Hours	**: 50**	**Exam Hours**	**: 03**
CREDITS	**: 04**		

Course objectives :

To provide students with knowledge of engineering chemistry for building technical competence in industries, research and development in the following fields

- Electrochemistry & Battery Technology.
- Corrosion & Metal Finishing.
- Fuels & Solar energy.
- Polymers.
- Water Technology & Nano Materials.

Module - 1

Electrochemistry and Battery Technology

Electrochemistry : Introduction, Derivation of Nernst equation for electrode potential. Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of electrode potential using calomel electrode. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems.

Battery Technology : Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle life and shelf life. Construction, working and applications of Zinc-Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries.

Fuel Cells : Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte.

10 - Hours

Module -2

Corrosion and Metal Finishing :

Corrosion : Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity, and temperature. Types of corrosion- Differential metal, differential aeration (Pitting and water line) and stress. Corrosion control: Inorganic coatings-Anodizing of Al and phosphating; Metal coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods).

Metal Finishing : Introduction, Technological importance. Electroplating: Introduction, principles governing-Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion & electrolyte; pH, temperature & throwing power of plating bath; additives- brighteners, levellers, structure modifiers & wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium(decorative and hard). Electro less plating: Introduction, distinction between electroplating and electro less plating, electro less plating of copper & manufacture of double sided Printed Circuit Board with copper.

10 - Hours

Module - 3

Fuels and Solar Energy :

Fuels : Introduction, classification, calorific value- gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. Cracking: Introduction, fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers. Gasoline and diesel knocking and their mechanism, anti knocking agents, power alcohol & biodiesel.

Solar Energy : Introduction, utilization and conversion, photovoltaic cells-construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells. Production of solar grade silicon: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (n&p types).

10 - Hours

Module - 4

Polymers : Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average, numerical problems. Glass transition temperature (T_g): Factors influencing T_g-Flexibility, inter molecular forces, molecular mass, branching & cross linking and stereo regularity. Significance of T_g. Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane and polycarbonate. Elastomers: Introduction, synthesis, properties and applications of Silicone rubber. Adhesives: Introduction, synthesis, properties and applications of epoxy resin. Polymer Composites: Introduction, synthesis, properties and applications of Kevlar. Conducting polymers: Introduction, mechanism of conduction in Poly aniline and applications of conducting poly aniline.

10 - Hours

Module - 5

Water Technology and Nanomaterials :

Water Technology : Introduction, boiler troubles with disadvantages & prevention methods-scale and sludge formation, priming and foaming, boiler corrosion(due to dissolved O_2, CO_2 and $MgCl_2$). Determination of DO, BOD and COD, numerical problems on COD. Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis & electro dialysis (ion selective).

Nano Materials : Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation & chemical vapour condensation processes). Nano scale materials- carbon nano tubes, nano wires, fullerenes, dendrimers, nano rods, & nano composites.

10 - Hours

Course outcomes :

On completion of this course, students will have knowledge in:

- Electrochemical and concentration cells. Classical & modern batteries and fuel cells.
- Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to

corrosion, wear, tear, impact etc. by electroplating and electro less plating.

- Production & consumption of energy for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy.
- Replacement of conventional materials by polymers for various applications.
- Boiler troubles; sewage treatment and desalination of sea water, and Over viewing of synthesis, properties and applications of nanomaterials.

Question paper pattern :

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books :

1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah & Pushpa Iyengar., **"Chemistry for Engineering Students"**, Subhash Publications, Bangalore.
2. R.V.Gadag & A.Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi.
3. P.C.Jain & Monica Jain.,**"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi.

Reference Books :

1. O.G.Palanna,**"Engineering Chemistry"**,Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.
2. G.A.Ozin & A.C. Arsenault, **"Nanochemistry A Chemical Approach to Nanomaterials"**, RSC publishing, 2005.
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition.
4. V.R.Gowariker, N.V.Viswanathan & J.Sreedhar., **"Polymer Science"**, Wiley-Eastern Ltd.
5. M.G.Fontana., **"Corrosion Engineering"**, Tata McGraw Hill Publishing Pvt. Ltd. New Delhi.

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ELEMENTS OF CIVIL ENGINEERING & MECHANICS

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	**: 15CIV13/15CIV23**	**IA Marks**	**: 20**
Hours/Week	**: 04**	**Exam Marks**	**: 80**
Total Hours	**: 50**	**Exam Hours**	**: 03**
CREDITS	**: 04**		

Course Objectives :

The objectives of this course is to make students to learn basics of Civil Engineering concepts and infrastructure development, solve problems involving Forces, loads and Moments and know their applications in allied subjects. It is a pre-requisite for several courses involving Forces, Moments, Centroids, Moment of inertia and Kinematics.

Module – 1

Introduction to Civil Engineering and Mechanics

Introduction to Civil Engineering :

Scope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering.

1- Hours

Infrastructure: Types of infrastructure, Role of Civil Engineer in the Infrastructural Development, Effect of the infrastructural facilities onsocio-economic development of a country.

1- Hours

Roads: Classification of Roads and their functions, Comparison of Flexible and Rigid Pavements (Advantages and Limitations)

1- Hours

Bridges: Types of Bridges and Culverts, RCC, Steel and Composite Bridges

1- Hours

Dams: Different types of Dams based on Material, Structural behaviour and functionality with simple sketches.

1- Hours

Introduction to Mechanics :

Basic idealizations - Particle, Continuum and Rigid body; Newton's laws

Force and its characteristics, types of forces-Gravity, Lateral and its distribution on surfaces, Classification of force systems, Principle of physical independence, superposition, transmissibility of forces, Introduction to SI units.

2- Hours

Couple, Moment of a couple, Characteristics of couple, Moment of a force, Equivalent force - Couple system; Numerical problems on moment of forces and couples, on equivalent force - couple system.

3- Hours

Module - 2

Analysis of Concurrent Force Systems
Concepts: Resultants and Equilibrium :
Composition of forces - Definition of Resultant; Composition of coplanar - concurrent force system, Parallelogram Law of forces, Principle of resolved parts;

3- Hours

Numerical problems on composition of coplanar concurrent force systems. Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar – concurrent and non-concurrent force systems.

3- Hours

Application- Static Friction in rigid bodies in contact :
Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes;

2- Hours

Numerical Problems on single and two blocks on inclined planes

2- Hours

Module – 3

Analysis of Non-Concurrent Force Systems :
Concepts : Resultants and Equilibrium
Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent Force system.

5- Hours

Application-Support Reaction in beams :
Types of Loads and Supports, statically determinate beams, Numerical problems onsupport reactions for statically determinate beams with Point

load (Normal and inclined) and uniformly distributed and uniformly varying loads and Moments.

5- Hours

Module - 4

Centroids and Moments of Inertia of Engineering Sections
Centroids :
Introduction to the concept, centroid of line and area, centroid of basic geometrical figures, computing centroid for– T, L, I, Z and full/quadrant circular sections and their built up sections. Numerical problems

5- Hours

Moment of Inertia :
Introduction to the concept, Radius of gyration, Parallel axis theorem, Perpendicular axis theorem, Moment of Inertia of basic planar figures, computing moment of Inertia for – T, L, I, Z and full/quadrant circular sections and their built up sections. Numerical problems

5- Hours

Module - 5

Kinematics
Concepts and Applications :
Definitions – Displacement – Average velocity – Instantaneous velocity – Speed – Acceleration - Average acceleration – Variable acceleration – Acceleration due to gravity – Newton's Laws of Motion.

2- Hours

Rectilinear Motion–Numerical problems.

2- Hours

Curvilinear Motion – Super elevation – ProjectileMotion – Relative motion – Numerical problems.

3- Hours

Motion under gravity – Numerical problems.

3- Hours

Course Outcomes :
After a successful completion of the course, the student will be able to:

1. Know basics of Civil Engineering, its scope of study, knowledge about Roads, Bridges and Dams;
2. Comprehend the action of Forces, Moments and other loads on systems of rigid bodies;

3. Compute the reactive forces and the effects that develop as a result of the external loads;
4. Locate the Centroid and compute the Moment of Inertia of regular cross-sections.
5. Express the relationship between the motion of bodies and
6. Equipped to pursue studies in allied courses in Mechanics.

Question Paper Pattern :

- 10 Questions are to be set such that 2 questions are selected from each module.
- 2 Questions are to be set under respective modules.
- Intra module questions are to be set such that the questions should cover the entire module and further, should be answerable for the set marks.
- Each question should be set for 16 marks (Preferably 8 marks each)
- Not more than 3 sub questions are to be set under any main question
- Students should answer 5 full questions selecting at least 1 from each module.

Text Books :

1. **Elements of Civil Engineering and Engineering Mechanics** by M.N. Shesha Prakash and Ganesh. B. Mogaveer, PHI Learning, 3rd Revised edition (2014)
2. **Engineering Mechanics-Statics and Dynamics** by A Nelson, Tata McGraw Hill Education Private Ltd, New Delhi, 2009.
   Elements of Civil Engineering (IV Edition) by S.S. Bhavikatti, New Age International Publisher, New Delhi, 3rd edition 2009.

References :

1. Engineering Mechanics by S.Timoshenko,D.H.Young, and J.V.Rao, TATA McGraw-Hill Book Company, New Delhi
2. Beer FP and Johnson ER, **"Mechanics for Engineers- Dynamics and Statics"**- 3rd SI Metric edition, Tata McGraw Hill. - 2008
3. Shames IH, **"Engineering Mechanics – Statics & Dynamics"**- PHI – 2009

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PROGRAMMING IN C AND DATA STRUCTURES

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	**: 15PCD13/15PCD23**	**IA Marks**	**: 20**
Hours/Week	**: 04**	**Exam Marks**	**: 80**
Total Hours	**: 50**	**Exam Hours**	**: 03**
CREDITS	**: 04**		

Course objectives :

The objectives of this course is to make students to learn basic principles of Problem solving, implementing through C programming language and to design & develop programming skills. To gain knowledge of data structures and their applications.

Module - 1

Introduction to C Language : Pseudo code solution to problem, Basic concepts in a C program, Declaration, Assignment & Print statements, Data Types, operators and expressions etc, Programming examples and exercise.
Text 1: Chapter 2. **Text 2:** 1.1, 1.2, 1.3 **10- Hours**

Module -2

Branching and Looping : Two way selection (if, if-else, nested if-else, cascaded if-else), switch statement, ternary operator? Go to, Loops (For, while-do, do-while) in C, break and continue, Programming examples and exercises.
Text 1: Chapter 3. **Text 2:** 4.4. **10-Hours**

Module – 3

Functions, Arrays and Strings :
Arrays and Strings : Using an array, Using arrays with Functions, Multi-Dimensional arrays. String: Declaring, Initializing, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples and Exercises.
Text 1: 5.7, **Text 2**: 7.3, 7.4, chapter 9
Functions : Functions in C, Argument Passing – call by value, call by reference, Functions and program structure, location of functions, void and parameter less Functions, Recursion, Programming examples and exercises.
Text 1: 1.7, 1.8, Chapter 4. **Text 2:** 5.1 to 5.4. **10-Hours**

Module - 4

Structures and File Management :

Basic of structures, structures and Functions, Array of structures, structure Data types, type definition, Defining, opening and closing of files, Input and output operations, Programming examples and exercises

Text 1: 6.1 to 6.3. **Text 2**: 10.1 to 10.4, Chapter 11. **10-Hours**

Module-5

Pointers and Preprocessors & Data Structures :

Pointers and address, pointers and functions (call by reference) arguments, pointers and arrays, address arithmetic, character pointer and functions, pointers to pointer ,Initialization of pointer arrays, Dynamic memory allocations methods, Introduction to Preprocessors, compiler control Directives, Programming examples and exercises.

Text 1: 5.1 to 5.6, 5.8. **Text 2: 12.2,** 12.3**, 13.1 to 13.7**.

Introduction to Data Structures : Primitive and non primitive data types, Abstract data types, Definition and applications of Stacks, Queues, Linked Lists and Trees.

Text 2 : 14.1, 14.2, 14.11, 14.12, 14.13, 14.15, 14.16, 14.17, 15.1.

10-Hours

Course outcomes : On completion of this course, students are able to

- Achieve Knowledge of design and development of C problem solving skills.
- Understand the basic principles of Programming in C language
- Design and develop modular programming skills.
- Effective utilization of memory using pointer technology Understands the basic concepts of pointers and data structures.

Question paper pattern :

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books :

1. Brian W. Kernighan and Dennis M. Ritchie: **The C Programming Language**, 2nd Edition, PHI, 2012.
2. Jacqueline Jones & Keith Harrow: "**Problem Solving with C**", 1st Edition, Pearson 2011.

Reference Books:

1. Vikas Gupta : "**Computer Concepts and C Programming**", Dreamtech Press 2013.
2. R S Bichkar, Programming with C, University Press, 012.
3. V Rajaraman: "**Computer Programming in C**", PHI, 2013.

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ELEMENTS OF MECHANICAL ENGINEERING

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	**: 15EME14/15EME24**	**IA Marks**	**: 20**
Hours/Week	**: 04**	**Exam Marks**	**: 80**
Total Hours	**: 50**	**Exam Hours**	**: 03**
CREDITS	**: 04**		

Course objectives :

Students belonging to all branches of Engineering are made to learn certain fundamental topics related to mechanical engineering so that they will have a minimum understanding of mechanical systems, equipment and process.

Module -1

Energy Resources : Non-renewable and renewable energy resources, **Petroleum based** solid, liquid and gaseous fuels, Calorific values of fuels, Combustion and combustion products of fuels, **Solar Power:** Solar Radiation, Solar constant (definition only), Solar Thermal energy harvesting, ex: liquid flat plate collectors, solar ponds (principle of operation only), Solar photovoltaic principle. **Wind Power:** principle of operation of a typical windmill. **Hydro Power:** Principles of electric power generation from hydro power plants, **Nuclear Power:** Principles of Nuclear power plants, **Bio Fuels:** introduction to bio fuels, examples of various biofuels used in engineering applications, Comparison of biofuels with petroleum fuels in terms of calorific value and emission. **Steam Formation and Properties:** Classification of boilers, Lancashire boiler, Babcock and Wilcox boiler, boiler mountings and accessories (No sketches for mountings and accessories), wet steam, saturated and superheated steam, specific volume, enthalpy and internal energy. (No numerical problems in this module)

10- Hour

Module -2

Turbines and IC Engines and Pumps Steam turbines : Classification, Principle of operation of Impulse and reaction turbines, Delaval's turbine, Parson's turbine. (No compounding of turbines).

Gas turbines : Classification, Working principles and Operations of Open cycle and closed cycle gas turbines.

Water turbines : Classification, Principles and operations of Pelton wheel, Francis turbine and Kaplan turbine

Internal Combustion Engines : Classification, I.C. Engines parts, 2 Stroke and 4 stroke Petrol engines, 4 stroke diesel engines. P-V diagrams of Otto

and Diesel cycles. Problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency, and specific fuel consumption, [numerical on IC Engines].

10-Hours

Module -3

Machine Tools and Automation Machine Tools Operations :

Turning, facing, knurling, Thread cutting, Taper Turning by swivelling the compound rest, Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring, -Plane milling, End milling, Slot milling. (No sketches of Machine tools, sketches to be used only for explaining operations. Students to be shown the available machine tools in the Machine Shop of the college before explaining the operations)

Robotics and Automation :

Robotics : Introduction, classification based on robots configuration; Polar, cylindrical, Cartesian Coordinate and spherical. Application, Advantages, and disadvantages

Automation : Definition, types–Fixed, Programmable & Flexible automation, NC/ CNC machines: Basic elements with simple block diagrams, advantages and disadvantages.

10-Hours

Module - 4

Engineering materials and joining processes:

Engineering Materials : Types and applications of Ferrous & Nonferrous metals and alloys,

Composites : Introduction: Definition, Classification and applications (Air-craft and Automobiles)

Soldering, Brazing and Welding :

Definitions, classification and method of soldering, Brazing and welding. Differences between soldering, Brazing and Welding. Description of Electric Arc Welding and Oxy-Acetylene Welding.

10-Hours

Module -5

Refrigeration, Air-Conditioning :

Refrigerants : properties of refrigerants, list of commonly used refrigerants. Refrigeration–Definitions–Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, unit of Refrigeration. Principle and working of vapor compression refrigeration and vapour absorption

refrigeration: Principles and applications of air conditioners, Room air conditioner.

10-Hours

Course Outcomes :

Students shall demonstrate knowledge associated with,

1. Various Energy sources, Boilers, Prime movers such as turbines and IC engines, refrigeration and air-conditioning systems
2. Metal removal process using Lathe, drilling, Milling Robotics and Automation.

Fair understanding of application and usage of various engineering materials.

Question paper pattern :

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.
- Each full question will have sub questions covering all the topics under a module.

Text Books :

1. V.K.Manglik, **"Elements of Mechanical Engineering"**, PHI Publications, 2013. (Module-1,2,4,5)
2. MikellP.Groover, **"Automation, Production Systems & CIM"**, 3rd Edition, PHI (Module -3)
3. K.R.Gopalkrishna, **"A text Book of Elements of Mechanical Engineering"**- Subhash Publishers, Bangalore. (Module -1,2,3,4,5)

Reference Books :

1. S.TrymbakaMurthy, **"A Text Book of Elements of Mechanical Engineering"**, 4th Edition 2006, Universities Press (India) Pvt Ltd, Hyderabad.
2. K.P.Roy, S.K.HajraChoudhury, Nirjhar Roy, **"Elements of Mechanical Engineering"**, Media Promoters & Publishers Pvt Ltd,Mumbai,7th Edition,2012
3. Pravin Kumar, **"Basic Mechanical Engineering"**, 2013 Edition, Pearson.

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COMPUTER AIDED ENGINEERING DRAWING

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	**: 15CED14/15CED24**	**IA Marks**	**: 20**
Hours/Week	**: 6 (2T + 4L)**	**Exam Marks**	**: 80**
Total Hours	**: 84**	**Exam Hours**	**: 03**
CREDITS	**: 04**		

Course objectives :

Engineering drawing is an important tool for all Engineers and for many others professionals. It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it.

The aim of the subject is to equip students with the fundamentals of Computer Aided Engineering Drawing and to further the ability to communicate information by graphical means.

Module -1

Introduction to Computer Aided Sketching :

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. of HP, VP, RPP & LPP. of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering. **06-Hours**

Module -2

Orthographic projections : Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems).

Orthographic Projections of Plane Surfaces (First Angle Projection Only) : Introduction, Definitions-projections of plane surfaces-triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates).

20-Hours

Module-3

Projections of Solids (First angle Projection only) :

Introduction, Definitions-Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on octahedrons and combination solid).

28-Hours

Module-4

Sections and Development of Lateral Surfaces of Solids :

Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on sections of solids)

Development of lateral surfaces of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).

15-Hours

Module-5

Isometric Projection (Using Isometric Scale Only) :

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three solids).

15-Hours

Course outcomes : After studying this course,

1. Students will be able to demonstrate the usage of CAD software.
2. Students will be able to visualize and draw Orthographic projections, Sections of solids and Isometric views of solids.
3. Students are evaluated for their ability in applying various concepts to solve practical problems related to engineering drawing.

Question paper pattern :

1. Module -1 is only for practice and Internal Assessment and not for examination.
2. Question paper for each batch of students will be sent online by VTU and has to be downloaded before the commencement of Examination of each batch. The answer sheets will have to be jointly evaluated by the Internal & External examiners.
3. A maximum of **THREE** questions will be set as per the following pattern *(No mixing of questions from different Modules).*

Q. No.	From Chapters	Marks Allotted
1	Module 2(Choice between (Points+Lines or Planes)	25
2	Module 3	30
3	Module 4 or Module 5	25
	Total	**80**

Q. No.	Solutions and Sketching in the Graph Book	Computer Display and Printout	Total Marks
1	10	15	25
2	12	18	30
3	13	12	25
Total Marks	**35**	**45**	**80**

Students have to submit the computer printouts and the sketches drawn on the graph sheets at the end of the examination. Both Internal & External examiners have to jointly evaluate the solutions (sketches) and computer display & printouts of each student for 80 marks (35 marks for solutions & sketches + 45 marks for computer display and printouts) and submit the marks list along with the solution (sketches) on graph sheets & computer printouts in separate covers.

4. Each batch must consist of a minimum of 10 students and a maximum of 12 students.
5. Examination can be conducted in parallel batches, if necessary.

Text Books :

1. **"Engineering Drawing"** - N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat.

2. **"Computer Aided Engineering Drawing"** by Dr. M H Annaiah, Dr. C N Chandrappa and Dr. B Sudheer Premkumar, Fifth edition, New Age International Publishers.

Reference Books :

1. **Computer Aided Engineering Drawing** - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006.
2. **Engineering Graphics** - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers, Bangalore.
3. **Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production**- Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.
4. **A Primer on Computer Aided Engineering Drawing-2006**, Published by VTU, Belgaum.

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BASIC ELECTRICAL ENGINEERING

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	**: 15ELE15/15ELE25**	**IA Marks**	**: 20**
Hours/Week	**: 04**	**Exam Marks**	**: 80**
Total Hours	**: 50**	**Exam Hours**	**: 03**
CREDITS	**: 04**		

Course objectives :

- Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
- Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- Develop selection skill to identify the type of generators or motors required for particular application.
- Highlight the importance of transformers in transmission and distribution of electric power.
- Emphasize the effects of electric shock and precautionary measures.
- Improve the ability to function on multi-disciplinary teams.

Module -1

D C Circuits : Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy. Illustrative examples.

5-Hours

Electromagnetism : Review of field around a conductor and coil, magnetic flux and flux density, magnetomotive force and magnetic field intensity, reluctance and permeability, definition of magnetic circuit and basic analogy between electric and magnetic circuits. (These topics are not to be considered for setting the examination questions).

Electromagnetic induction : Definition of Electromagnetic Induction, Faradays Laws, Fleming's right hand rule, Lenz's Law, Statically and dynamically induced emf. Self-inductance, mutual inductance and coefficient of coupling. Energy stored in magnetic field. Illustrative examples. Force on current carrying conductor placed in a magnetic field, Fleming's left hand rule.

5- Hours

Module -2

DC Machines : Working principle of DC machine as a generator and a motor. Types and constructional features. Types of armature windings, Emf equation of generator, relation between induced emf and terminal voltage with a mention of brush contact drop and drop due to armature reaction. Illustrative examples, neglecting armature reaction. Operation of DC motor, back emf, torque equation. Types of DC motors, characteristics and applications. Significance of back emf. Necessity of a starter for DC motor. Illustrative examples on back emf and torque.

7- Hours

Measuring Instruments : Construction and Principle of operation of dynamometer type wattmeter and single phase induction type energy meter.

3-Hours

Module -3

Single-phase AC circuits : Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying quantities, phasor representation of alternating quantities. Analysis, with phasor diagrams, of R, L, C, R-L, R-C and R-L-C circuits and, parallel and series- parallel circuits. Real power, reactive power, apparent power and power factor. Illustrative examples.

7-Hours

Domestic wiring : Service mains, meter board and distribution board. Brief discussion on concealed conduit wiring. Two-way and three-way control. Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's). Electric shock, precautions against shock, Objectives of Earthing, types of earthing; pipe and plate earthing, Residual current circuit breaker (RCCB).

3-Hours

Module-4

Three Phase Circuits : Necessity and advantages of three phase systems, generation of three phase power. Definition of Phase sequence, balanced supply and balanced load. Relationship between line and phase values of

balanced star and delta connections. Power in balanced three-phase circuits, measurement of power by two-wattmeter method. Determination power factor using wattmeter readings. Illustrative examples.

6-Hours

Three Phase Synchronous Generators: Principle of operation, Types and constructional features, Advantages of rotating field type alternator, Synchronous speed, Frequency of generated voltage, Emf equation. Concept of winding factor (excluding the derivation of distribution and pitch factors). Illustrative examples on calculation of distribution factor, pitch factor and emf equation.

4-Hours

Module-5

Single Phase Transformers : Necessity of transformer, Principle of operation and construction of single-phase transformers (core and shell types). Emf equation, losses, variation losses with respect to load, efficiency, Condition for maximum efficiency, Voltage regulation and its significance (Open Circuit and Short circuit tests, equivalent circuit and phasor diagrams are excluded). Illustrative problems on emf equation and efficiency only.

6-Hours

Three Phase Induction Motors : Principle of operation, Concept and production of rotating magnetic field, Synchronous speed, rotor speed, Slip, Frequency of the rotor induced emf, Types and Constructional features. Slip and its significance. Applications of squirrel - cage and slip - ring motors. Necessity of a starter, starting of motor using stars-delta starter. Illustrative examples on slip calculations.

4-Hours

Course outcomes :

After the completion of the course, the student should be able

- To predict the behaviour of electrical and magnetic circuits.
- Select the type of generator / motor required for a particular application.
- Realize the requirement of transformers in transmission and distribution of electric power and other applications.
- Practice Electrical Safety Rules & standards.
- To function on multi-disciplinary teams.

Question paper pattern :

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module

Text Books

1	Basic Electrical Engineering	D. C. Kulshreshtha	TMH	1st Edition, Revised
2	Electrical Technology	Edward Hughes	Pearson	10th Edition, 2014
	Reference Books			
3	Fundamentals of Electrical Engineering	Rajendra Prasad	PHI	Third Edition 2014
4	Basic Electrical Engineering	AbhijitChakrabarti, Chandan Kumar Chanda, Sudiptanath	TMH,	1st Edition 2010
5	Fundamentals of Electrical Engineering and Electronics	B. L. Theraja	S. Chand & Company Ltd	Reprint Edition 2013

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BASIC ELECTRONICS

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code: 15ELN15/15ELN25 **IA Marks : 20**
Hours/Week : 04 **Exam Marks : 80**
Total Hours : 50 **Exam Hours : 03**
CREDITS : 04

Course Objectives :
The course objective is to make students of all the branches of Engineering to understand the efficacy of Electronic principles which are pervasive in engineering applications

Module -1

Semiconductor Diodes and Applications (Text-1): p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line analysis, Half-wave rectifier, Two-diode Full-wave rectifier, Bridge rectifier, Capacitor filter circuit (only qualitative approch), Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator. Numerical examples as applicable.

6-Hours

Bipolar Junction Transistors : BJT operation, BJT Voltages and Currents, BJT amplification, Common Base, Common Emitter and Common Collector Characteristics, Numerical examples as applicable.

4-Hours

Module -2

BJT Biasing (Text-1) : DC Load line and Bias Point, Base Bias, Voltage divider Bias, Numerical examples as applicable.

4-Hours

Introduction to Operational Amplifiers (Text-2) : Ideal OPAMP, Inverting and Non Inverting OPAMP circuits, OPAMP applications: voltage follower, addition, subtraction, integration, differentiation; Numerical examples as applicable.

6-Hours

Module - 4

Digital Electronics (Text 1) : Introduction, Switching and Logic Levels, Digital Waveform (Sections 9.1 to 9.4). Number Systems: Decimal Number System, Binary Number System, Converting Decimal to Binary, Hexadecimal Number System, Converting Binary to Hexadecimal, Hexadecimal to Binary, Converting Hexadecimal to Decimal, Converting Decimal to Hexadecimal, Octal Numbers, Binary to Octal Conversion, Complement of Binary Numbers, Boolean Algebra Theorems, De Morgan's theorem, Digital Circuits: Logic gates, NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, & XNOR Gate. Algebraic Simplification, NAND and NOR Implementation (Sections 11.7 and 11.8). HAND implementation, NOR implementation. Half adder, Full adder.

10 Hours

Module-4

Flip Flops (Text 1) : Introduction to Flip Flops (Section 12.1), NAND Gate Latch, NOR Gate Latch, RS Flip Flop, Gated Flip Flops, Clocked RS Flip Flop (Sections 12.2 to 12.5).

5 Hours

Microcontrollers (Ref 1) : Introduction to Microcontrollers, 8051 Microcontroller Architecture and an example of Microcontroller based oxygen meter control system (only Block Diagram approach).

5 Hours

Module-5

Communication Systems (Text-2) : Introduction, Elements of Communication Systems, Modulation: Amplitude Modulation, Spectrum Power, AM Detection (Demodulation), Frequency and Phase Modulation, Amplitude and Frequency Modulation: A comparison.

6-Hours

Transducers (Text-2) : Introduction, Passive Electrical Transducers, Resistive Transducers, Resistance Thermometers, Thermistor, Linear Variable Differential Transformer (LVDT), Active Electrical Transducers, Piezoelectric Transducer, Photoelectric Transducer.

4-Hours

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

- *Appreciate the significance of electronics in different applications.*
- *Understand the applications of diode in rectifiers, filter circuits and wave shaping.*
- *Apply the concept of diode in rectifiers, filters circuits.*
- *Design simple circuits like amplifiers (inverting and non inverting), comparators, adders, integrator and differentiator using OP AMPS.*
- *Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates, and*
- *Understand the functionality of a communication system and different modulation technologies, and*
- *Understand the basic principles of different types of Transducers.*

Question paper pattern :

- *The question paper will have ten questions.*
- *Each full Question consisting of 16 marks.*
- *There will be 2 full questions (with a **maximum** of **four** sub questions) from each module.*
- *Each full question will have sub questions covering all the topics under a module.*
- *The students will have to answer 5 full questions, selecting one full question from each module.*

Text Books :

1. David A. Bell, **"Electronic Devices and Circuits"**, Oxford University Press, 5th Edition, 2008.
2. D.P. Kothari, I. J. Nagrath, **"Basic Electronics"**, McGraw Hill Education (India) Private Limited, 2014.

Reference Books :

MuhammadAli Mazidi, **"The 8051 Microcontroller and Embedded Systems. Using Assembly and C."** Second Edition, 2011, Pearson India.

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WORKSHOP PRACTICE

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code: 15WSL16/15WSL26

Hours/Week : 3 (1 hr Tutorial + 2 hrs lab)		**IA Marks**	**: 20**
		Exam Marks	**: 80**
Total Hours : 42		**Exam Hours**	**: 03**
CREDITS : 02			

Course objectives:

- To impart knowledge and skill to use tools, machines, equipment, and measuring instruments.
- Educate students of Safe handling of machines and tools.

Module -1

1. Use of Hand Tools: V-block, Marking Gauge, Files, Hack Saw, Drills, Taps and Minimum 3 models involving Dove tail joint, Triangular joint and Semicircular joint.
2. Welding: Study of electric arc welding tools &equipments, Models: Butt Joint, Lap Joint, T joint & L-joint.
3. Sheet Metal & Soldering Work: Development & Soldering of the models: Tray, Frustum of cone, Prism(Hexagon & Pentagon),Truncated Square Pyramid, Funnel.
4. Study & Demonstration of power tools in Mechanical Engineering.

Course outcomes:

At the end of the course, the student will be able to:

1. Demonstrate and produce different types of fitting models.
2. Gain knowledge of development of sheet metal models with an understanding of their applications.
3. Perform soldering and welding of different sheet metal & welded joints.
4. Understand the Basics of Workshop practices.

Scheme of Examination :

Fitting Model / Sheet Metal Work	: 40 Marks
Welding	: 20 Marks
Viva Voce	: 20 Marks
Total	: 80 Marks

Ref Books: Elements of Workshop Technology:Vol I:Manufacturing Processes, S K Hajra. Choudhury, A K. Hajra Choudhury,15th Edition Reprinted 2013,Media Promoters &Publishers Pvt Ltd., Mumbai.

Note: No mini drafters and drawing boards required. Drawings (Developments) can be doneon sketch sheets using scale , pencil and Geometrical Instruments

COMPUTER PROGRAMMING LABORATORY

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject code	:	**15CPL 16 /15CPL26**	**IA Marks**	:	**20**
Hours/Week	:	**3 (1 hr Tutorial + 2 hrs lab)**	**Exam Marks**	:	**80**
Total Hours	:	**48**	**Exam Hours**	:	**03**
CREDITS	:	**02**			

Course objectives : To provide basic principles C programming language. To provide design & develop of C programming skills. To provide practical exposures like designing flowcharts, algorithms, how to debug programs etc.

Descriptions (if any) : Demonstration of Personal Computer and its Accessories: Demonstration and Explanation on Disassembly and Assembly of a Personal Computer by the faculty-in-charge. Students have to prepare a write-up on the same and include it in the Lab record and evaluated.

Laboratory Session-1 : Write-up on Functional block diagram of Computer, CPU, Buses, Mother Board, Chip sets, Operating System & types of OS, Basics of Networking & Topology and NIC.

Laboratory Session-2 : Write-up on RAM, SDRAM, FLASH memory, Hard disks, Optical media, CD-ROM/R/RW, DVDs, Flash drives, Keyboard, Mouse, Printers and Plotters. Introduction to flowchart, algorithm and pseudo code.

Note : These **TWO Laboratory sessions** are used to fill the gap between theory classes and practical sessions. Both sessions are to be evaluated as lab experiments.

Laboratory Experiments :

Implement the following programs with WINDOWS / LINUX platform using appropriate C compiler.

1. Design and develop a flowchart or an algorithm that takes three coefficients (***a***, ***b***, and ***c***) of a Quadratic equation ($ax^2+bx+c=0$) as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.

2. Design and develop an algorithm to find the ***reverse*** of an integer number **NUM** and check whether it is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: Num: **2014**, Reverse: **4102**, Not a Palindrome

3.
   a. Design and develop a flowchart to find the square root of a given number ***N***. Implement a C program for the same and execute for all possible inputs with appropriate messages. Note: **Don't use library function *sqrt(n)*.**
   b. Design and develop a C program to read a ***year*** as an input and find whether it is ***leap year*** or not. Also consider end of the centuries.

4. Design and develop an algorithm to evaluate polynomial $\mathbf{f(x) = a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0}$, for a given value of x and its coefficients using Horner's method. Implement a C program for the same and execute the program with different set of values of coefficients and x.

5. Draw the flowchart and Write a C Program to compute **Sin(x)** using Taylor series approximation given by $\mathbf{Sin(x) = x - (x^3/3!) + (x^5/5!) - (x^7/7!) + ...}$
   Compare your result with the built- in Library function. Print both the results with appropriate messages.

6. Develop an algorithm, implement and execute a C program that reads ***N*** integer numbers and arrange them in ascending order using ***Bubble Sort***.

7. Develop, implement and execute a C program that reads two matrices ***A*** (**m x n**) and ***B*** (**p x q**) and Compute product of matrices ***A*** and ***B***. Read matrix ***A*** and matrix ***B*** in row major order and in column major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only. Program must check the compatibility of orders of the matrices for multiplication. Report appropriate message in case of incompatibility.

8. Develop, implement and execute a C program to search a Name in a list of names using ***Binary searching*** Technique.

9. Write and execute a C program that
   i. Implements string copy operation ***STRCOPY*** (str1,str2) that copies a string *str1* to another string *str2* without using library function.
   ii. Read a *sentence* and print frequency of vowels and total count of consonants.

10.

a. Design and develop a C function ***RightShift***(x, n) that takes two integers x and n as input and returns value of the integer x rotated to the right by n positions. Assume the integers are unsigned. Write a C program that invokes this function with different values for x and n and tabulate the results with suitable headings.

b. Design and develop a C function ***isprime***(num) that accepts an integer argument and returns 1 if the argument is prime, a 0 otherwise. Write a C program that invokes this function to generate prime numbers between the given range.

11. Draw the flowchart and write a ***recursive*** **C** function to find the factorial of a number, ***n!***, defined by $fact(n)=1$, if $n=0$. Otherwise $fact(n)=n*fact(n-1)$. Using this function, write a C program to compute the binomial coefficient ${}_nC_r$. Tabulate the results for different values of ***n*** and ***r*** with suitable messages.

12. Given two university information files "**studentname.txt**" and "**usn.txt**" that contains students Name and USN respectively. Write a C program to create a new file called "**output.txt**" and copy the content of files "studentname.txt" and "usn.txt" into output file in the sequence shown below. Display the contents of output file "output.txt" on to the screen.

Student Name	USN
Name 1	USN1
Name 2	USN2
....	....
....	....

Heading

13. Write a C program to maintain a record of **n** student details using an array of structures with four fields (Roll number, Name, Marks, and Grade). Assume appropriate data type for each field. Print the marks of the student, given the student name as input.

14. Write a **C** program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of **n** real numbers.

Course Outcomes :

- Gaining Knowledge on various parts of a computer.
- Able to draw flowcharts and write algorithms
- Able design and development of C problem solving skills.
- Able design and develop modular programming skills.
- Able to trace and debug a program

Conduction of Practical Examination :

1. All laboratory experiments (nos) are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script for breakup of marks
4. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

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ENGINEERING PHYSICS LAB

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject code	:	15PHYL17/15PHYL27	IA Marks	:	20
Hours/Week	:	3 (1 hr Tutorial + 2 hrs lab)	Exam Marks	:	80
Total Hours	:	48	Exam Hours	:	03
CREDITS	:	02			

Course Objectives :

- The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies. To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to develop and fabricate engineering and technical equipments.
- Design of circuits using new technology and latest components and to develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.

Experiments :

1. Black box experiment; Identification of unknown passive electrical components and determine the value of Inductance and Capacitance
2. Series and parallel LCR Circuits (Determination of resonant frequency and quality factor)
3. I–V Characteristics of Zener Diode. (determination of knee voltage, zener voltage and forward resistance)
4. Characteristics of Transistor (Study of Input and Output characteristics and calculation of input resistance, output resistance and amplification factor)
5. Photo Diode Characteristics (Study of I–V characteristics in reverse bias and variation of photocurrent as a function of reverse voltage and intensity).
6. Dielectric constant (Measurement of dielectric constant).
7. Diffraction (Measurement of wavelength of laser source using diffraction grating).
8. Torsional pendulum (Determination of M.I. of wire and Rigidity modulus).
9. Determination of Fermi energy. (Measurement of Fermi energy in copper).
10. Uniform Bending Experiment (Determination of Youngs modulus of material bar).

11. Newtons Rings, (Determination of radius of curvature of plano convex lens).
12. Verification of Stefan's Law.

Course Outcomes :

On Completion of this course, students are able to –

- Develop skills to impart practical knowledge in real time solution.
- Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
- Design new instruments with practical knowledge.
- Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoretical problems.
- Understand measurement technology, usage of new instruments and real time applications in engineering studies.

Note :

1) All the above twelve experiments are to be conducted
2) Two experiments are to be performed by the students in the examination

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ENGINEERING CHEMISTRY LABORATORY

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject code	:	**15CHEL17/15CHEL27**	**IA Marks**	:	**20**
Hours/Week	:	**3 (1 hr Tutorial + 2 hrs lab)**	**Exam Marks**	:	**80**
Total Hours	:	**50**	**Exam Hours**	:	**03**
CREDITS	:	**02**			

Course objectives :

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

Instrumental Experiments :

1. Estimation of FAS potentiometrically using standard $K_2Cr_2O_7$ solution.
2. Estimation of Copper colorimetrically.
3. Estimation of Acids in acid mixture conductometrically.
4. Determination of pKa of weak acid using pH meter.
5. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
6. Estimation of Sodium and Potassium in the given sample of water using Flame Photometer.

Volumetric Experiments :

1. Estimation of Total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.
4. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by External Indicator method.
5. Estimation of Alkalinity (OH^-, CO_3^{--} & HCO_3^-) of water using standard HCl solution.
6. Determination of COD of waste water.

Course Outcomes :

On completion of this course, students will have the knowledge in,

- Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results, and
- Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

Conduction of Practical Examination :

1. All experiments are to be included for practical examination.
2. One instrumental and another volumetric experiments shall be set.
3. Different experiments shall be set under instrumental and a common experiment under volumetric.

Reference Books :

1. G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney, **"Vogel's Text Book of Quantitative Chemical Analysis"**
2. O.P.Vermani & Narula, **"Theory and Practice in Applied Chemistry"**, New Age International Publisers.
3. Gary D. Christian, **"Analytical chemistry"**, 6th Edition, Wiley India.

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CONSTITUTION OF INDIA, PROFESSIONAL ETHICS & HUMAN RIGHTS

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code:15CPH18/15CPH28 **IA Marks : 10**
Hours Week : 02 **Exam Marks : 40**
Total Hours : 25 **Exam Hours : 02**

Course objectives:

1. To provide basic information about Indian constitution
2. To identify individual role and ethical responsibility towards society
3. To understand human rights and its implications

Module 1

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution.

2-Hours

Preamble to the Indian Constitution Fundamental Rights & its limitations.

3-Hours

Module 2

Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties.

2-Hours

Union Executives – President, Prime Minister Parliament Supreme Court of India.

3-Hours

Module 3

State Executives – Governor Chief Minister, State Legislature High Court of State.

2-Hours

Electoral Process in India Amendment Procedures, 42nd, 44th, 74th, 76th, 86th &91st Amendments.

3-Hours

Module 4

Special Provision for SC & ST Special Provision for Women, Children & Backward Classes Emergency Provisions Human Rights Meaning and

Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India

3-Hours

Powers and functions of Municipalities, Panchyats and Co-Operative Societies.

Module 5

2-Hours

Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility.

2-Hours

Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.

1-Hours

Course outcomes :
After study of the course, the students are able to

- Have general knowledge and legal literacy and thereby to take up competitive examinations
- Understand state and central policies, fundamental duties
- Understand Electoral Process, special provisions
- Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, and
- Understand Engineering ethics and responsibilities of Engineers
- Have an awareness about basic human rights in India

Text Books :

1. Durga Das Basu: **"Introduction to the Constitution on India"**, (Students Edn.) Prentice Hall EEE, 19th Ed, 2001
2. Charles E. Harris, Michael S Pritchard and Michael J Rabins **"Engineering Ethics"** Thompson Asia, 2003 03 03

Reference Books :

1. M V Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002
2. M Govindarajan, S Natarajan, V S Senthilkumar, **"Engineering Ethics"**, Prentice Hall of India Pvt Ltd New Delhi, 2004
3. Brij Kishore Sharma,**"Introduction to the Constitution of India"**, PHI Learning Pvt Ltd., New Delhi, 2011
4. Latest Publications of Indian Institute of Human Rights, New Delhi

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ENVIRONMENTAL STUDIES

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject code	:	**15CIV18/15CIV28**	**IA Marks**	:	**10**
Hours/Week	:	**2 (1 hr Tutorial + 2 hrs lab)**	**Exam Marks**	:	**40**
Total Hours	:	**25**	**Exam Hours**	:	**02**
CREDITS	:	**02**			

Course Objectives:

To identify the major challenges in environmental issues and evaluate possible solutions.

Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.

To analyze an overall impact of specific issues and develop environmental management plan

Module - 1

Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, And Economic & Social Security.

2-Hours

Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation Environmental Impact Assessment, Sustainable Development.

3-Hours

Module - 2

Natural Resources, Water resources – Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water Mineral resources, Forest Wealth Material Cycles – Carbon Cycle, Nitrogen Cycle & Sulphur Cycle.

2-Hours

Energy – Different types of energy, Conventional sources & Non Conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy.

3-Hours

Module -3

Environmental Pollution – Water Pollution, Noise pollution, Land Pollution, Public Health Aspects.

2-Hours

Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Waste Water Management.

3-Hours

Module -4

Air Pollution & Automobile Pollution: Definition, Effects – Global Warming, Acid rain & Ozone layer depletion, controlling measures.

3-Hours

Solid Waste Management, E - Waste Management & Biomedical Waste Management - Sources, Characteristics & Disposal methods.

2-Hours

Module - 5

Introduction to GIS & Remote sensing, Applications of GIS & Remote Sensing in Environmental Engineering Practices.

2-Hours

Environmental Acts & Regulations, Role of government, Legal aspects, Role of Non-governmental Organizations (NGOs) , Environmental Education & Women Education.

3-Hours

Course Outcome:

Students will be able to,

1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment,
3. Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components

Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues

Text Books:

1. Benny Joseph (2005), **"Environmental Studies"**, Tata McGraw Hill Publishing Company Limited.
2. R.J.Ranjit Daniels and Jagadish Krishnaswamy, (2009), **"Environmental Studies"**, Wiley India Private Ltd., New Delhi.
3. R Rajagopalan, **"Environmental Studies – From Crisis to Cure"**, Oxford University Press, 2005.
4. Aloka Debi, **"Environmental Science and Engineering"**, Universities Press (India) Pvt. Ltd. 2012.

Reference Books:

1. Raman Sivakumar, **"Principals of Environmental Science and Engineering"**, Second Edition, Cengage learning Singapore, 2005
2. P Meenakshi, **"Elements of Environmental Science and Engineering"**, Prentice Hall of India Private Limited, New Delhi, 2006
3. S.M Prakash, **"Environmental Studies"**, Elite Publishers Mangalore, 2007
4. Erach Bharucha, **"Text Book of Environmental Studies"**, for UGC, University press, 2005
5. G.Tyler Miller Jr., **"Environmental Science – working with the Earth"**, Tenth Edition, Thomson Brooks /Cole, 2004
6. G.Tyler Miller Jr., **"Environmental Science – working with the Earth"**, Eleventh Edition, Thomson Brooks /Cole, 2006
7. Dr.Pratiba Sing, Dr.AnoopSingh and Dr.Piyush Malaviya, **"Text Book of Environmental and Ecology"**, Acme Learning Pvt. Ltd. New Delhi

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ENGINEERING MATHEMATICS-II

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	: **15MAT21**			
Hours/Week	: **04**	**IA Marks**	: **20**	
Total Hours	: **50**	**Exam Marks**	: **80**	
CREDITS	: **04**	**Exam Hours**	: **03**	

Course objectives :

To enable students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following

- Ordinary differential equations
- Partial differential equations
- Double and triple integration
- Laplace transform

Module – 1

Differential equations-1 :

Linear differential equations with constant coefficients : Solutions of second and higher order differential equations - inverse differential operator method, method of undetermined coefficients and method of variation of parameters.

10-Hours

Module -2

Differential equations-2 :

Linear differential equations with variable coefficients : Solution of Cauchy's and Legendre's linear differential equations.

Nonlinear differential equations - Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions, Clairauit's equations and equations reducible to Clairaut's form.

10-Hours

Module – 3

Partial Differential equations :

Formulation of Partial differential equations by elimination of arbitrary constants/functions, solution of non-homogeneous Partial differential equations by direct integration, solution of homogeneous Partial differential equations involving derivative with respect to one independent variable only.

Derivation of one dimensional heat and wave equations and their solutions by variable separable method.

10-Hours

Module-4

Integral Calculus :

Double and triple integrals : Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. Application of double and triple integrals to find area and volume.

Beta and Gamma functions : definitions, Relation between beta and gamma functions and simple problems.

10-Hours

Module-5

Laplace Transform :

Definition and Laplace transforms of elementary functions. Laplace transforms of $e^{at}f(t)$, $t^n f(t)$ and $\frac{f(t)}{t}$ (without proof), periodic functions and unit-step function- problems.

Inverse Laplace Transform :

Inverse Laplace Transform - problems, Convolution theorem to find the inverse Laplace transforms(without proof) and problems, solution of linear differential equations using Laplace Transforms.

10-Hours

Course Outcomes :

On completion of this course, students are able to,

- Solve differential equations of electrical circuits, forced oscillation of mass spring and elementary heat transfer.
- Solve partial differential equations fluid mechanics, electromagnetic theory and heat transfer.
- Evaluate double and triple integrals to find area, volume, mass and moment of inertia of plane and solid region.
- Use curl and divergence of a vector valued functions in various applications of electricity, magnetism and fluid flows.
- Use Laplace transforms to determine general or complete solutions to linear ODE
-

Question paper Pattern :

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions (with a **maximum** of **four** sub questions) from each module.

- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module

Text Books :

- B. S. Grewal, **"Higher Engineering Mathematics"**, Khanna publishers, 42nd edition, 2013.
- Kreyszig, **"Advanced Engineering Mathematics"**- Wiley, 2013

Reference Books :

- B.V.Ramana **"Higher Engineering M athematics"** Tata Mc Graw-Hill, 2006
- N P Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.
- H. K. Dass and Er. Rajnish Verma, **"Higher Engineerig Mathematics"**, S. Chand publishing, 1st edition, 2011.

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Functional English

Introduction	Importance of Languages	
Grammer	Parts of Speech, Usage of Preposition and Article, Punctuation	5 Hours
Tenses & Degrees of Comparison		3 Hours
Transformation of Sentences	Active-Passive, Affirmative-Negative, Exclamatory-Assertive, Interrogative-Assertive, Kinds of sentences	5 Hours
Direct-Indirect Speech		5 Hours
Vocabulary Usage	Homonyms, Correcting Spelling, One-word equivalents	7 Hours
Precis Writing		3 Hours
Essay/Report Writing		5 Hours
Letter Writing	Personal, Official, Applications	5 Hours
Idioms & Phrases	Meaning & Usage in sentences	5 Hours
Comprehension	Of an unseen passage	2 Hours
Elaboration	Expansion of ideas, proverbs	2 Hours
Presentation	Preparation of materials and presentation step	3 Hours

Suggested Text Books :

1) SLN Sharma & K Shankaranarayana **"Basic Grammar"**, Navakarnataka Publications.
2) Jones **"New International Business English"**, published by Cambridge University Press.

Reference Books :

1) G. Sankaran, **"English Rank Scorer"**, Addone Publishing group, Thiruvanantapuram, Kerala
2) Wren & Martin **"English Grammar"**.
3) John Seely, **"Oxford Guide to Speaking and Writing"**, 2000

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Kannada Kali

Lesson 1 :	Introducing each other – 1. Personal Pronouns, Possessive forms, Interrogative words.
Lesson 2 :	Introducing each other – 2. Personal Pronouns, Possessive forms, Yes/No Type Interrogation
Lesson 3 :	About Ramanaya. Possessive forms of nons, dubitive question, Relative nouns
Lesson 4 :	Enquiring about a room for rent. Qualitative and quantitative adjectives.
Lesson 5 :	Enquiring about the college. Predicative forms, locative case.
Lesson 6 :	In a hotel Dative case defective verbs.
Lesson 7 :	Vegetable market. Numeral, plurals.
Lesson 8 :	Planning for a picnic. Imperative, Permissive, hortative.
Lesson 9 :	Conversation between Doctor and the patient. Verb- iru, negation – illa, non – past tense.
Lesson 10 :	Doctors advise to Patient. Potential forms, no – past continuous.
Lesson 11 :	Discussing about a film. Past tense, negation.
Lesson 12 :	About Brindavan Garden. Past tense negation.
Lesson 13 :	About routine activities of a student. Verbal Participle, reflexive form, negation.
Lesson 14 :	Telephone conversation. Past and present perfect past continuous and their negation.
Lesson 15 :	About Halebid, Belur. Relative participle, negation.
Lesson 16 :	Discussing about examination and future plan. Simple conditional and negative
Lesson 17 :	Karnataka (Lesson for reading)
Lesson 18 :	Kannada Bhaashe (Lesson for reading)
Lesson 19 :	Mana taruva Sangati alla (Lesson for reading)
Lesson 20 :	bEku bEDagaLu (lesson for reading)

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Functional English

Introduction	Importance of Languages	
Grammer	Parts of Speech, Usage of Preposition and Article, Punctuation	5 Hours
Tenses & Degrees of Comparison		3 Hours
Transformation of Sentences	Active-Passive, Affirmative-Negative, Exclamatory-Assertive, Interrogative-Assertive, Kinds of sentences	5 Hours
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Vocabulary Usage	Homonyms, Correcting Spelling, One-word equivalents	7 Hours
Precis Writing		3 Hours
Essay/Report Writing		5 Hours
Letter Writing	Personal, Official, Applications	5 Hours
Idioms & Phrases	Meaning & Usage in sentences	5 Hours
Comprehension	Of an unseen passage	2 Hours
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Lesson 18 :	Kannada Bhaashe (Lesson for reading)
Lesson 19 :	Mana taruva Sangati alla (Lesson for reading)
Lesson 20 :	bEku bEDagaLu (lesson for reading)

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ಕನ್ನಡ ಮನಸು

1. ಶ್ರಾವಣ (ಕವನ) ದ.ರಾ.ಬೇಂದ್ರೆ
2. ಡಾ. ವಿಶ್ವೇಶ್ವರಯ್ಯ ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ (ವ್ಯಕ್ತಿಚಿತ್ರ) ಎ.ಎನ್. ಮೂರ್ತಿರಾವ್
3. ದೋಣಿ ಹರಿಗೋಲುಗಳಲ್ಲಿ (ಪ್ರವಾಸ ಕಥನ) ಶಿವರಾಮ ಕಾರಂತ
4. ಅಣ್ಣಪ್ಪನ ರೇಷ್ಮೆ ಕಾಯಿಲೆ (ಪ್ರಬಂಧ) ಕುವೆಂಪು
5. ನಮ್ಮ ಎಮ್ಮೆಗೆ ಮಾತು ತಿಳಿಯುವುದೇ (ವಿನೋದ) ಗೋರೂರು ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರ್
6. ಆನೆಹಳ್ಳದಲ್ಲಿ ಹುಡುಗಿಯರು(ವಿಜ್ಞಾನ ಲೇಖನ) ಬಿ.ಜಿ.ಎಲ್ ಸ್ವಾಮಿ
7. ಬೆಡ್ ನಂ. ಏಳು (ಕತೆ) ತ್ರಿವೇಣಿ
8. ರೊಟ್ಟಿ ಮತ್ತು ಕೋವಿ (ಕವನ) ಸು.ರಂ.ಎಕ್ಕುಂಡಿ
9. ಗುಬ್ಬಚ್ಚಿ ಗೂಡು (ಅಂಕಣ ಬರಹ) ಲಂಕೇಶ್
10. ಚೀಂಕ್ರ ಮೇಸ್ತ್ರಿ ಮತ್ತು ಹಾವುಮೀನು (ಪರಿಸರ ಲೇಖನ) ಕೆ.ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ
11. ಗಾಂಧಿ (ಕತೆ) ಬೆಸಗರಹಳ್ಳಿ ರಾಮಣ್ಣ
12. ಬೆಲ್ಚಿಯ ಹಾಡು (ಕವನ) ಸಿದ್ಧಲಿಂಗಯ್ಯ
13. ಎಲ್ಲ ಹುಡುಗಿಯರ ಕನಸು (ಕವನ) ಸವಿತಾ ನಾಗಭೂಷಣ
14. ನೀರು (ಕತೆ) ಬಸವರಾಜ ಕುಕ್ಕರಹಳ್ಳಿ
15. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಸ್ವರೂಪ (ಪರಿಚಯ ಲೇಖನ) ರಹಮತ ತರೀಕೆರೆ
16. ತಂತ್ರಜ್ಞಾನ ಕಲಿಕೆಯಲ್ಲಿ ಭಾಷೆ (ತಂತ್ರಜ್ಞಾನ ಬರಹ) ಎಸ್.ಸುಂದರ್
17. ಕೊಣವೇಗೌಡ (ಕಾವ್ಯ) ಜಾನಪದ

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