GOVERNMENT OF KERALA
DEPARTMENT OF TECHNICAL EDUCATION

CURRICULUM OF DIPLOMA IN ENGG/TECHNOLOGY
CREDIT BASED SEMESTER SYSTEM
(Revision 2015)
OUTCOME BASED CURRICULUM
[as per G.O. (MS) No.212/2015/H. Edn. Dated 27.05.2015]

RULES & REGULATIONS
&
Syllabus of Semester I & II

Rules and regulations for the conduct of Diploma programmes in Engineering/Technology/ Commercial practice/ Management in the Polytechnic Colleges recognised by the State Board of Technical Education, Kerala state.

REVISION

2015

Prepared by

STATE INSTITUTE OF TECHNICAL TEACHERS

TRAINING & RESEARCH, KALAMASSERY

Contents

DEFINITIONS

In these rules and regulations unless the context otherwise requires:

1.1 Academic Calendar

Academic Calendar means the calendar of academic activities undertaken during a semester as prescribed by the State Board of Technical Education.

1.2 Academic Year

Academic Year in relation to a programme means a period of 10 months spanning two successive calendar years, which includes instructional periods, holidays and examinations which shall invariably consist of 2 semesters, called odd and even semesters.

1.3 Course

Course means the study of an individual subject in a particular semester (traditionally referred to as subject/ paper) which shall include theory, practical, field work, project work etc.

1.4 Course Categories

Course Categories means the distribution of courses for a programme.

1.5 Credit

Credit means the sum of lecture periods in instructional hours and half the hours of practical, drawing etc. allotted for teaching the course, specified in the curriculum. A student earns as much number of credits for a course if he/ she completes the prescribed course as per the curriculum and satisfies the criteria fixed for such course
by the State Board of Technical Education.

1.6 Curriculum

Curriculum for a course or programme means a written document prepared by the State Board of Technical Education which states the educational objectives detailing the integrated sequence of areas of study covered under the course or programme with detailed contents, recommendations as to the learning experiences to be given to students and methodology of student evaluation for achieving the learning objectives for the student undergoing the course or programme in each semester which among other things shall include the syllabus, theory, practical, project work, etc. and the rules and regulations contained herein.

1.7 Diploma

Diploma means a certificate, declaring that the holder has successfully completed a programme specified in the curriculum for such programme and satisfies the criteria fixed for such programme by the State Board of Technical Education.

1.8 Instructional Hour

Instructional hour means a period of instruction of 55 minutes duration.

1.9 Faculty Advisor

Faculty Advisor means a teacher who is in charge of a particular semester of a programme with the responsibility of primarily monitoring the diverse activities associated with that particular semester of a programme.

1.10 Programme

Programme means the entire course of study and examinations (traditionally referred to as course) prescribed for the same leading to the award of diploma.

1.11 Semester

Semester means a period of 5 months in an academic year, which shall include instructional periods, holidays and examinations. Odd semesters shall span from June to October. Even Semesters shall span from November to March.

1.12 Student

Student means a candidate admitted to or registered for a course or programme in accordance with these rules and regulations.

Rules and Regulations

2.1   Duration of the Diploma Programme

The duration of a programme shall be of 3 (three) academic years, consisting of 6 (six) consecutive semesters. The maximum duration permissible for acquiring diploma shall be 6 academic years from the commencement of the programme.

In case of Tool & Die Engineering, additional 12 months inplant training shall be mandatory for awarding diploma.

2.2   Medium of Instruction

The medium of instruction and examination shall be English.

2.3   Eligibility for Registration for a Programme

A pass with eligibility for higher studies in the Xth class examination (S.S.L.C) conducted by the Board of Public Examinations, Kerala State or equivalent examinations with mathematics, science and English as three of the subjects studied for engineering and technology programmes and mathematics and English as two of the subjects studied for Commercial Practice and Computer application & Business Management programmes, recognized by the Board of Public Examinations of Kerala State.

2.4   Instructional Duration in an Academic Year

An academic year shall consist of 2 (two) semesters.

Odd semester in an academic year shall span from June to October (Including Holi- days and Examinations) and even semester in an academic year shall span from November to March (Including Holidays and Examinations).

i. A semester normally consists of 75 days of Instruction.

ii. A programme shall follow semester pattern, with end of semester examinations for each semester conducted by the State Board of Technical Education, Kerala State.

iii. There shall be 7 (seven) periods of 55 (fifty five) minutes duration of instruction each day for 5 days per week.

2.5 Course Categories

The courses of study shall be in accordance with the scheme and syllabi pre- scribed in the curriculum. A programme shall consist of following course categories:

2.5.1 Foundation Courses

Foundation Courses are courses covering areas which are required to build a foundation for further studies in the programme selected by the student.

2.5.2 Common Courses

Common Courses are courses to be studied by all students admitted to a programme.

2.5.3 Basic Technology Courses

Basic Technology Courses are foundation courses which aim to bridge the courses of pure science/ social science/ commercial practice/ applied science/ management with the applied technology and elective courses.

2.5.4 Applied Technology Courses

Applied Technology Courses are professional level terminal courses through which the desired knowledge and skills are achieved by the students to perform his/ her job functions in the programme selected by the student.

2.5.5 Elective Courses

Elective Courses are integrated courses providing detailed knowledge in specific areas in the same or related course with an aim to develop knowledge and awareness in other interdisciplinary areas of study.

2.6 Minimum credits to be earned for award of diploma

A student shall acquire the minimum credits for each course/category of courses as prescribed in the curriculum and satisfy such other criteria fixed by the State Board of Technical Education, to be entitled for the award of diploma in the programme.

2.7 Programme Registration

Each student admitted to the programme shall be required to take the registration for programme. This registration shall be valid for 6 (six) academic years. If a student fails to earn the diploma within a period of six academic years, his registration shall be treated as cancelled and he/she will forfeit the credits already earned for the programme.

2.8   Semester Registration

Every student admitted/promoted to a semester has to complete the semester registration at the beginning of the semester. A unique Permanent Register Number shall be issued by the Controller of Technical Examinations to each student at the time of first semester registration. This unique number shall be used for all references such as further semester registration, examination registration and other academic activities.

2.9   Examination

I. The examinations for a programme shall be conducted by the State Board of Technical Education in accordance with the curriculum prescribed for the programme. All candidates who have done semester registration shall register for examinations by remitting the prescribed fee whenever the Controller of Technical examinations notifies.

II. No candidate shall be permitted to appear for end of semester examinations unless

   (a) He/ she is certified by the principal to the effect that he/she has attended 75% of the actual instructional hours for all the courses put together in the particular semester.

   (b) He/ she has completed all the prescribed laboratory, practical, workshop practical or any other kind of practical including drawing, field work, project work etc. as prescribed in the curriculum and so certified by the Head of Department of the concerned programme. Such certification shall be on the basis of the recommendations of the faculty handling the course.

   (c) Students are eligible for condonation as per Govt. order in force

III. Students who do not satisfy clauses 2.9 - II above shall have to register for the same semester as and when it is offered in the institution afresh and shall have to fulfill such conditions prescribed by the State Board of Technical Education subjected to clause 2.12.

IV. A student shall have to remit the fees prescribed by the Government from time to time for registration/ re-registration for the course along with application in the prescribed form.

V. A student shall not be allowed to re-register for a course or reappear for an examination for which he/she has gained the prescribed credits.

2.10 Promotion to next semester.

A student is promoted to the next semester only if he/she had the eligibility for appearing for the previous semester examination satisfying clause 2.9.

2.11 Roll out and readmission

A student with 15 days of continuous absence shall be removed from roll. He/she shall be readmitted only if he/she is claimed for readmission within 15 days from the date of roll out. Readmission can be sought only to the semester in which he was studying at the time of rolled out. Attendance for eligibility for appearing to the semester examination for such cases shall be counted from the commencement of the semester.

2.12 Repeating a semester

A student with less than 75% of attendance and has not condoned the shortage of attendance or has attendance less than 65% or he/ she has not completed all the prescribed laboratory, practical, workshop practical or any other kind of practical including drawing, field work, project work etc. as prescribed in the curriculum and got certified by the Head of Department of the concerned programme shall have to repeat the semester. He/she can repeat the semester only with the succeeding batch as and when it is offered in the institution and this shall be on the discretion of the Principal on being satisfied as to the genuineness of the absence. In case of scheme change, the student has to earn credits for the equivalent and additional subjects decided by the Department of Technical Education.

2.13 Assessment of students

2.13.1 General

The assessment of students for each course shall be done through continuous internal assessment and end of semester examinations. Internal assessment shall be conducted throughout the semester.

Internal assessment marks of theory and practical courses shall be published in the college on the dates stipulated in the academic calendar.

2.13.2 Internal assessment for Theory Courses

The maximum marks awarded for internal continuous assessment and end of semester examinations shall be 50 and 100 respectively, totaling to 150.

The weightage awarded for internal assessment marks shall be as follows:

	Criteria Component	Weightage (%)
1	Test Papers (Average of best 2)	50
2	Assignments (Minimum 3)	30
3	Attendance	20

2.13.3 Internal Assessment for Practical Courses

Internal continuous assessment and end of semester practical examinations have

1:1 weightage, with 50 marks allotted for internal continuous assessment and 50 marks for End of Semester examinations.

The weightage for internal continuous assessment marks for practical courses shall be as follows:

S. No	Criteria Component	Weightage (%)
1	Observation Note / Rough Record	20
2	Fair Record (Timely Submission, Accuracy and Neatness)	20
3	Attendance	20
4	Test	40

2.13.4 Internal Assessment for Drawing Courses

S. No	Criteria Component	Weightage (%)
1	Submission of Completed Drawing Sheets	40
2	Test	40
3	Attendance	20

2.14   Assessment of end of Semester Examinations

(Practical Courses)

i. An external examiner and an internal examiner, appointed by the State Board of Technical Education, shall conduct the End of Semester examinations of practical courses.

ii. No candidate shall be allowed to attend the End of Semester Practical Examinations unless he/she produces certified record of the laboratory/workshop/Project.

iii. Award of marks in the End of Semester practical examinations (except Project) shall be as follows:

S. No	Criteria Component	Weightage (%)
1	Fair record	10
2	Viva Voce	20
3	Procedure & Tabulation	30
4	Conduct of Experiment	20
5	Result & Inference	20

2.14.1 Assessment of Seminar

S. No	Criteria Component	Weightage (%)
1	Relevance of Topic	10
2	Collection of Materials	20
3	Presentation (Presentation slides, delivery)	40
4	Question Answer / Discussion	10
5	Seminar Report	10
6	Attendance	10

2.14.2 Assessment of Project Work

Assessment of project work shall be in accordance with the course objective as it may differ from program to program.

2.14.3 Assessment of Industrial training/visit

Assessment of industrial training/visit shall be in accordance with the course objective as it may differ from program to program.

2.14.4 Assessment for Theory Courses

The theory courses shall be accessed through end of semester examinations, con- ducted by the State Board of Technical Education, Kerala. The Duration of the end of semester examination shall be 3 hours. Question papers shall be prepared based on:

i. Emphasizing Knowledge Testing, Problem solving & Quantitative methods.

ii. With sufficient data and related information on problems given.

iii. Covering all sections of the syllabus as contained in the model question papers.

iv. Without ambiguity and free from any defects and errors.

v. Having clear and complete instructions to the candidates.

2.15 Pattern of question papers for theory courses

The entire syllabus for the theory course shall be divided into 4 Modules / Units. The maximum marks for the course shall be 100. Different patterns of question papers are permitted for courses involving drawing, design etc. In such cases the modified pattern should be specified along with the syllabus for the course. The model question paper will form part of the curriculum. The general pattern of question papers shall be as follows:

PART A: Short Answer Questions (One/Two Sentences) 5x2 Marks = 10 Marks

All Questions are Compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem Solving Questions 5 x 6 Marks = 30 Marks

Candidates will have to answer Five questions out of Seven. There should be at least one question from each module and not more than 2 questions from any module.

PART C: Descriptive/Analytical/Problem Solving Questions 4 x 15 Marks = 60 Marks

Two questions from each module with Choice to answer one question. Weightage for categories of questions like, recollection, problem solving, descriptive, drawing/ diagrammatic etc. shall be specified along with the syllabus, if necessary. Model question paper shall be prepared for each course at the time of framing the syllabus. The model question paper along with the syllabus must be sent to the question paper setter for framing questions.

2.16 Grading System

1. The State Board of Technical Education shall award Letter Grade to students based on the marks secured by them in both internal assessment and end of semester examinations for each course.

Each Letter Grade indicates a qualitative assessment of the student's performance and is associated with specified grade points. All candidates will be allotted grades according to the marks scored by them. The grading system based on the marks scored is as follows:

S. No	Range of marks (%)	Grade	Description	Grade Points
1	90 and above	S	Outstanding	10
2	[80 to 90)	A	Excellent	9
3	[70 to 80)	B	Very Good	8
4	[60 to 70)	C	Good	7
5	[50 to 60)	D	Average	6
6	[40 to 50)	E	Satisfactory	5
7	Below 40	F	Unsatisfactory	0

Where [X-Y) means, X included and Y excluded.

2. State Board of Technical Education shall issue to the students a Grade Card on Completion of each semester. The Grade Card Shall contain the following:

   (a) The Title of the Course, Category - Foundation, Common Course, Basic Technology, Applied Technology and Elective Course.

   (b) Credits associated with and grades awarded for each course.

   (c) The Number of Credits earned and Grade Point Average.

   (d) Cumulative Grade Point Average.

2.17 Minimum requirements for earning credit

A candidate must secure a minimum of 40% marks in the end of semester examination for theory and a combined 40% marks for internal & external assessment put together in theory and practical courses to secure the credit for the course.

2.18 Cumulative grade point average (CGPA)

CGPA is the weighted average of grade points obtained in all courses registered for the diploma programme.

CGPA shall be computed for all the students at the end of each semester by taking into consideration their performance in all semesters as follows:

$$CGPA = \frac{\sum\limits_{i=1}^{n} C_i G_i}{\sum\limits_{i=1}^{n} C_i}$$

Where n is the number of courses registered up to that semester, Ci is the number of credits allotted to ith course as per the scheme and Gi is the grade points corresponding to the grade awarded to the student for the course.

CGPA shall be rounded off to the second place of decimal and recorded as such for representation. Whenever the CGPA are to be used for determining the merit ranking in a group of students only the rounded off values shall be made use of.

Percentage of marks can be computed from CGPA as:

$$\text{Percentage of marks} = CGPA * 9.5\%$$

2.19   Classification

To be eligible for the award of diploma for a particular programme a student should earn the requisite number of credits through successful completion of the courses of study.

There will be three classifications of successful candidates:

1. First Class with Distinction.

2. First Class.

3. Second Class.

i. A candidate who has earned the requisite number of credits will be classified as First Class with Distinction based on the CGPA attained if, -he/ she secures the requisite credits and CGPA of 8(eight) or above and fulfills the requirements for the award of diploma within 3 (three) consecutive years including the year of registration for the programme.

ii. A candidate who has earned the requisite number of credits will be classified as First Class based on the CGPA attained if, he/ she secures the requisite credits and CGPA of 6.5 or above and fulfills the requirements for the award of diploma within 4 (four) consecutive years including the year of registration for the programme.

iii. All other successful candidates shall be declared to be placed in Second Class.

iv. Provision for awarding rank in each programme will not be in existence

2.20   Grace marks

Grace marks (if any) earned by the student is restricted to a maximum of 10 marks for each course. In the case of Differently abled students, the grace mark will be awarded as per the Govt. Order in force

2.21   Academic Monitoring System

Academic monitoring shall be performed either in person or through online Academic Monitoring System by the State Institute of Technical Teachers Training and Research, Kalamassery in order to monitor the academic activities in the institution and verification of documents concerned.

2.22   Academic Calendar

The academic calendar shall be prepared by Department of Technical Education and shall be followed in all Polytechnic colleges.

2.23   Examination Monitoring Cell

The Principal shall constitute an Examination Monitoring Cell at the Polytechnic for supervising the academic activities. This cell shall have a senior staff member as convener and three members of which one shall be a woman. The duties and responsibilities of the Examination Monitoring Cell shall be

   i. To officiate as the examination squad to keep a vigil on all end of Semester Examinations. If any malpractice are found/ reported by the invigilator principal shall be appraised of the same with a report. The Principal shall forward such complaints to the Controller of Technical Examinations.

   ii. To receive any complaints from the students regarding issues like out of syllabus questions, printing mistakes, insufficient data etc of end of Semester examinations of Theory and Practical courses. The cell shall make a preliminary investigation of the complaint and if necessary forward it to the Controller of Technical Examinations through the Principal with specific comments.

   iii. To receive any complaints from students regarding internal examinations, make preliminary enquiry of such incidents and give report to Principal for necessary action.

2.24 Departmental Committee

Principal of the Polytechnic College shall form departmental committee for each department. The committee shall function during the entire semester of each academic year. The departmental Committee shall consists of the Head of Department, faculty advisor and three student representatives (one of them shall be a woman) from each class. The committee shall meet and deliberate at least for 2 times a semester. It shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Departmental Committee shall be recorded in a register for further reference. The Departmental Committee shall communicate its comments to the Principal.

The departmental committee shall,

i. Review periodically the progress and conduct of the students in the class.

ii. Discuss any problems concerning any course in the semester concerned.

iii. Identify weaker students in the class and suggest remedial measures for

helping him/her.

iv. Review teaching effectiveness and coverage of syllabus.

v. Discuss any other academic issues.

2.25 Anti - Ragging Cell

The Principal shall form an Anti - Ragging Cell at the commencement of each academic year. The cell shall function as per the orders and guidelines issued by the Government in this regard.

Semester I

SUBJECTS OF STUDY AND SCHEME OF EVALUATION
Semester I

Sl. No	Code	Course	Course Category	Periods per week			Credits	Type	Evaluation	
				Theory	Practical	Total			CA	External
1		English for Communication I	F	2	2	4	3	T	50	100
2		Engineering Mathematics I	F	6	0	6	6	T	50	100
3		Engineering Physics I	F	3	0	3	3	T	50	100
4		Engineering Chemistry I	F	3	0	3	3	T	50	100
5		Health & Physical education	C	1	2	3	2	P	50	50
6		Engineering Graphics	F	2	3	5	0	D	0	0
7		Workshop Practice	F	0	3	3	0	P	0	0
8		Computing Fundamentals	C	2	3	5	4	P	50	50
9		Engineering Science Lab	F	0	3	3	0	P	0	0
		Total		**19**	**16**	**35**	**21**		**300**	**500**

Abbreviations Used:

Course Categories: **F** – Foundation Courses, **C**-Common Courses, **B**-Basic Technology Courses,

        A – Applied Technology Courses, **E** – Elective Courses.

Evaluation Type: **T** – Theory, **P** – Practical, **D** – Drawing, **Pr** – Project.

End Examination for Engineering Graphics, Workshop practice and Engineering Science lab will be held only in the Second Semester.

COURSE TITLE	: English for Communication I
COURSE CODE	:
COURSE CATEGORY	: F
PERIODS/WEEK	: 4
PERIODS/SEMESTER	: 60
CREDITS	: 3

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Nurturing Nature – Environmental issues	15
2	Towards Tomorrow – Science & Technology	15
3	Sport 'S' miles – Sports & adventure	15
4	Media Matters - Media	15
	TOTAL	60

COURSE OUTCOME:

To develop the four basic skills in English and use them effectively in day-to-day life.

SPECIFIC OUTCOME:

After completing the course the student will be able to:

o Read articles, essays, and technical writings of various kinds and develop comprehension about the message, images, thoughts and ideas contained in these articles.
o Read short stories, poems, conversations and develop aesthetic sense and humanitarian ethos.
o Read various prose passages and develop skills in skimming and scanning.
o Understand the meaning of words used in passages by guessing meaning from the context.
o Develop curiosity about the different topics of current interest and express points of view.
o Familiarise themselves with different techniques of writing and use them effectively in business correspondences.
o Group and sequence ideas and exploit the potentials of cohesion and coherence.
o Acquire proficiency in correct usage of English words.
o Internalise correct pronunciation and use them in daily conversation.
o Develop communication skills by taking part in group discussions and present their views in a logical and convincing way.

- Learn different language functions like agreeing, permitting, apologizing, negating and the like and use them effectively in daily communication.
- Identify the different study skills and use them to improve their academic performance.

CONTENT DETAILS

MODULE - I
1.1   Reading Passage - Environmental Issues.
1.2   Vocabulary – Guessing meaning from the given clues and context
1.3   Grammar – Nouns, Pronouns, Adjectives, Articles & Determiners
1.4   Writing – Basic tips of writing
1.5   Language functions – Making requests, Agreeing/disagreeing
1.6   Speaking – Introducing oneself

MODULE - II
2.1   Reading Passage - Advancement in Science & Technology.
2.2   Vocabulary – Antonyms & Synonyms
2.3   Grammar – Verb Patterns, Concord,
2.4   Language functions – Asking/giving permission, Giving instructions
2.5   Writing – Introducing cohesive devices, writing a paragraph
2.6   Speaking – Presentation using PPT

MODULE - III
3.1   Reading passage - Sports and Adventure.
3.2   Vocabulary – Spelling, collocation
3.3   Grammar – Telling about what is happening, happened and will happen
3.4   Language functions – Accepting/negating, Apologizing
3.5   Writing – Job Application/Resume
3.6   Speaking – Telephone Conversation

MODULE - IV
4.1   Reading passage based on media.
4.2   Vocabulary – Technical Vocabulary – Related to computer, industry, business and Administration.
4.3   Grammar – Establishing cause & effect, telling about positions.
4.4   Language functions – Congratulating others, Expressing one's opinion, Giving directions.
4.5   Writing –An introduction to Technical Writing and Memos.
4.6   Speaking – Group Discussion.

REFERENCE BOOKS:-

1. Course Book – Words to Deeds (A Coursebook in English for Polytechnic College Students – Semester I)

COURSE TITLE   : **ENGINEERING MATHEMATICS – I**
COURSE CODE   :
COURSE CATEGORY   : **F**
PERIODS/WEEK   : **6**
PERIODS/SEMESTER   : **90**
CREDITS   : **6**

TIME SCHEDULE

MODULE NO.	CHAPTER NO	CHAPTER TITLE	PERIODS.
I		**TRIGONOMETRY-I**	
	1	ANGLES	2
	2	TRIGONOMETRIC RATIOS	5
	3	TRIGONOMETRIC RATIOS OF RELATED ANGLES	5
	4	HEIGHTS AND DISTANCES	4
	5	COMPOUND ANGLES	6
II		**TRIGONOMETRY-II**	
	6	MULTIPLE AND SUB MULTIPLE ANGLES	4
	7	SUM OR DIFFERENCE FORMULAE AND CONVERSE	4
	8	PROPERTIES AND SOLUTIONS OF TRIANGLES	10
III		**DIFFERENTIAL CALCULUS**	
	9	FUNCTIONS AND LIMITS	4
	10	DIFFERENTIATION-I	10
	11	DIFFERENTIATION-II	10
IV		**APPLICATIONS OF DIFFERENTIATION**	
	12	EQUATIONS OF TANGENTS AND NORMALS	4
	13	RATES AND MOTION	8
	14	MAXIMA AND MINIMA	4
	15	TUTORIALS, TESTS, ASSIGNMENTS	10
		TOTAL PERIODS	90

Students will be able to:-

- Describe the concept of an angle, its units and measurement.

- Define trigonometric ratios
  comprehend trigonometric ratios of standard angles
- Understand related angles of the type (n 90±θ) and solve simple problems on
  related angles

- Estimate heights and distances using trigonometry

- Define compound angles, multiple and sub multiple angles and state
   compound angles, multiple and sub multiple angles, sum or difference &
   converse formulae apply these formulae in solving problems
- State sine rule, cosine rule, tangent rule & projection formula
   and apply these rules to solve a given triangle
- Distinguish variables, constants and functions

- Evaluate the limit of a given function

- Define derivative of a function

- State standard results and rules of differentiation

- Apply the results and rules to solve problems

- Perform different methods of differentiation

- Solve problems on successive differentiation up to second order

- Illustrate derivative as a rate measurer

- Formulate and compute velocity and acceleration of a moving body

- Identify derivative as the slope of the tangent

- Estimate rate of change in related rate problems

- Evaluate maximum and minimum values of a function

- Solve simple problems on maxima and minima

SPECIFIC OUTCOME

MODULE-I   TRIGONOMETRY-I
    1.1 ANGLE
        1.1.1 Definition of an angle.
        1.1.2 Concept of an angle in trigonometry ,
        1.1.3   Different systems of measuring an angle.
        1.1.4   Definition of degree and radian.
        1.1.5   Express a right angle in different systems,
        1.1.6 Relation between degree & radian .
    1.2 TRIGONOMETRIC RATIOS.
        1.2.1 Definition of Trigonometric ratios

1.2.2 Trigonometric identities.(statements only)

1.2.3 Problems based on trigonometric identities,

1.2.4 Trigonometric ratios of standard angles like 0^0, 30^0, 45^0, 60^0 and 90^0.

1.2.5 Problems.

1.3 TRIGONOMETRIC RATIOS OF RELATED ANGLES

1.3.1 Angle of any magnitude and sign

1.3.2 Give examples to differentiate positive and negative angles

1.3.3 Trigonometric ratios in different quadrants and signs ASTC-Rule

1.3.4 Finding all other t-functions, when a t-function in a particular quadrant is given.

1.3.5Complementary angles and relation between trigonometric
      ratios of complementary angles.

1.3.6 Formulae of 90± Θ, 180± Θ, 270± Θ, 360± Θ and (-Θ)

1.3.7 Evaluation of sin 120, cos 330, tan 315

1.3.8 Problems on related angles.

1.4 HEIGHTS AND DISTANCES

1.4.1 Angle of elevation and angle of depression.

1.4.2 Simple problems on height and distance.

1.5 COMPOUND ANGLES.

1.5.1 Compound angles

1.5.2 Examples for compound angles.

1.5.3 Formulae of sin(A+B),and cos (A+B),

1.5.4 tan(A+B) in terms of tan A and tan B

1.5.5 Formula for sin(A-B),cos (A-B) and tan(A-B).

1.5.6 Simple problems on compound angles.

MODULE-II TRIGONOMETRY-II

2.1 MULTIPLE AND SUBMULTIPLE ANGLES.

2.1.1 Multiple and sub multiple angles with examples.

2.1.2 Formulae for sin2A,cos2A and tan 2A (statements only)

2.1.3 Formulae for sin 3A, cos 3A (statements only)

2.1.4 Simple problems on multiple angles (problems involving half angle formulae
      are excluded)

2.2 SUM OR DIFFERENCE FORMULAE AND CONVERSE

2.2.1 Expressions for sinC ± sinD and cosC ± cosD in terms of Product of trigonometric
      ratios.

2.2.2 Expressions for sinAcosB, cosAsinB, cosAcosB and sinAsinB in terms of the sum
      and difference of trigonometric ratios.

2.2.3 Simple problems.

2.3 PROPERTIES AND SOLUTION OF TRIANGLES.

2.3.1 The relation between sides of a triangle and Sines, Cosines and Tangents of
      any angle

2.3.2 Sine rule, Cosine rule and Tangent rule-(statements only.) ,

2.3.3 Projection formulae in any triangle.(no proof)

2.3.4 Simple problems on above rules.

2.3.5 Solution of a triangle in the following cases when

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     (i)   All the three sides are given
     (ii) Two sides and included angle are given
     (iii) Two angles and one side is given
2.3.6 Area of a triangle (Formulae and simple problems, no proof) when,
     (i) All the three sides a, b and c are given
     (ii) Two sides and one included angle are given

MODULE-III DIFFERENTIAL CALCULUS

3.1 FUNCTIONS AND LIMITS.   .

     3.1.1 Variables and Constants.
     3.1.2 Dependent and independent variables.
     3.1.3 Definition of a function
     3.1.4 Explicit and implicit functions
     3.1.5 Concept of limit of a function (intuitive idea only).
     3.1.6 Need for this concept in finding instantaneous rate of change like velocity and
         slope.
     3.1.7 Explanation of $\lim\limits_{x \to 0} \dfrac{1}{x} = \infty$ and $\lim\limits_{x \to \infty} \dfrac{1}{x} = 0$,
     3.1.8 Simple problems on evaluation of limits of functions
         (i) When x tends to 'a'
         (ii) By factorization,
         (iii) When x tends to '∞'
     3.1.9 Algebraic and trigonometrical limits:-

1) $\lim\limits_{x \to a} \dfrac{x^n - a^n}{x - a} = na^{n-1}$ for any rational number.

2) $\lim\limits_{\theta \to 0} \dfrac{\sin \theta}{\theta} = 1$ where θ is in radians

     3.1.10 Simple problems on evaluation of limits based on direct application of the
         above standard limits.

3.2 DIFFERENTIATION-I

     3.2.1 Increment and incremental ratio.
     3.2.2 Differential coefficient or derivative of a function.
     3.2.3 Derivatives of functions of x^n, sinx,and cosx with respect to 'x' from method of
         first principles
     3.2.4 List of standard derivatives.
     3.2.5 Derivatives of e^x and log x (no proof).
     3.2.6 Derivatives of inverse trigonometric functions (no derivation)
     3.2.7 Rules of differentiation: Sum, product and quotient of functions.
     3.2.8 Simple problems based on these rules.

3.3 DIFFERENTIATION-II

     3.3.1 Derivatives of function of a function (Chain rule).
     3.3.2 Problems based on chain rule.
     3.3.3 Differentiation of Implicit functions and Parametric functions.
     3.3.4 Simple problems on differentiation of implicit functions and parametric
         functions.

3.3.5 Successive differentiation up to second order.
3.3.6 Problems on successive differentiation.

MODULE-IV APPLICATIONS OF DIFFERENTIAL CALCULUS

4.1 EQUATIONS OF TANGENTS AND NORMALS
4.1.1 Geometrical meaning of derivative
4.1.2 Slope of a curve at a point.
4.1.3 Equations of tangent and normal to the curve y = f(x) at a given point.

4.2 RATES AND MOTION
4.2.1 Derivative as a rate measurer
4.2.2 Simple problems of rates occurring in engineering..
4.2.3 Velocity and acceleration
4.2.4 Simple problems to find velocity and acceleration of a moving body 13.5 when
     displacement 's' is given in terms of 't' and related problems
4.2.5 Problems to determine the rate of change of a variable, when the rate of change of
some related variable is given.

4.3 MAXIMA AND MINIMA
4.3.1 Increasing and decreasing functions.
4.3.2 Conditions for maxima and minima.(No proof)
4.3.3 Maxima and minima of a function.
4.3.4 Simple direct problems on maxima and minima.

CONTENTS DETAILS

MODULE - I

1.1 ANGLES
Definition of an angle, Concept of an angle in trigonometry Different systems of
measuring an angle, Definition of degree and radian, Express a right angle in different
systems,
Relation between degree & radian.

1.2 TRIGONOMETRIC RATIOS.
Definition of Trigonometric ratios, Trigonometric identities. (Statements only), Problems
based on trigonometric identities, Trigonometric ratios of standard angles like 0^0, 30^0,
45^0, 60^0 and 90^0.Problems.

1.3 TRIGONOMETRIC RATIOS OF RELATED ANGLES
Angle of any magnitude and sign, positive and negative angles
Trigonometric ratios in different quadrants and signs
ASTC-Rule, Complementary angles and relation between trigonometric ratios of
complementary angles.
Signs of trigonometric functions of related angles, Given a trigonometric functions of an
angle and its quadrant find others Formulae of 90± Ө, 180± Ө, 270± Ө, 360± Ө and (-Ө),
Problems on related angles, Evaluation of sin 120 ,cos 330, tan 315

1.4 HEIGHTS AND DISTANCES
Angle of elevation and angle of depression. Simple problems

1.5 COMPOUND ANGLES.
Compound angles, Examples, Addition and subtraction formulae, Expression of tan(A+B) in terms of tanA and tanB, Simple problems on compound angles.

MODULE - II

2.1 MULTIPLE AND SUBMULTIPLE ANGLES.
Multiple and sub multiple angles with examples, Formulae for sin2A,cos2A,tan2A,Sin3A,Cos3A(without proof), problems on multiple angles (problems involving half angle formulae are excluded)

2.2 SUM OR DIFFERENCE FORMULAE AND CONVERSE
Sum, Difference, product formulae, converse of product formulae (without proof) and simple problems based on it.

2.3 PROPERTIES AND SOLUTION OF TRIANGLES.
Sine rule, Cosine rule and Tangent rule-(statements only.), Projection formulae in any triangle.(no proof),Simple problems on above rules. Solution of a triangle when all the three sides are given ,two sides and included angle are given two angles and one side is given Area of a triangle (Formulae and simple problems, no proof) when all the three sides a, b and c are given & when two sides and one included angle are given

MODULE - III

3.1 FUNCTIONS AND LIMITS.
Variables and Constants. Dependent and independent variables Definition of a function Explicit and implicit functions, Concept of limit of a function, Explanation of $\lim\limits_{x\to 0}\frac{1}{x}=\infty$

and $\lim\limits_{x\to\infty}\frac{1}{x}=0$, Simple problems on evaluation of limits of functions(i) when x tends to 'a'(ii) by factorization, (iii) when x tends to '∞' Algebraic and trigonometrical limit(without proof) and simple problems based on it

3.2 DIFFERENTIATION-I
Increment and incremental ratio, derivative of a function, Derivatives of functions of x^n, sinx and cosx with respect to 'x' from method of first principles, List of standard derivatives. Derivatives of e^x ,log x & Derivatives of inverse trigonometric functions (no derivation), Rules of differentiation: Sum, product and quotient of functions. Simple problems based on these rules.

3.3 DIFFERENTIATION-II
Derivatives of function of a function (Chain rule).Problems based on chain rule. Differentiation of Implicit functions and Parametric functions.
Simple problems on differentiation of implicit functions and parametric functions,
Successive differentiation up to second order. Problems on successive differentiation.

MODULE - IV

4.1 EQUATIONS OF TANGENTS AND NORMALS
Geometrical meaning of derivative Slope of a curve at a point.
Equations of tangent and normal to the curve y = f(x) at a given point.

4.2 RATES AND MOTION
Derivative as a rate measurer, Simple problems of rates occurring in engineering, Velocity and acceleration, Simple problems to find velocity and acceleration of a moving body when displacement 's' is given in terms of 't' and related problems. Problems to determine the rate of change of a variable, when the rate of change of some related variable is given.

4.3 MAXIMA AND MINIMA
Increasing and decreasing functions. Conditions for maxima and minima.(No proof)
Maxima and minima of a function. Simple direct problems on maxima and minima

NB: Emphasis is given in application oriented problems and hence proofs and derivations are not expected.

Text Book:
Engineering Mathematics-I for polytechnic colleges by different authors.

Reference Books:
Anton   -   Calculus, 7 edn.   - WILEY
Dr.M.K.Venkatraman   -   Engineering Mathematics - National Publishing Co, Chennai
Dr.P.Kandasamy & Others - Engineering Mathematics - S.Chand & Co Ltd, New Delhi

COURSE TITLE	: ENGINEERING PHYSICS I
COURSE CATEGORY	: F
PERIODS PER WEEK	: 3
PERIODS /SEMESTER	: 45
CREDITS	: 3

TIME SCHEDULE

Module	Name of Module	Course Objective Number	Total periods per Semester		
			Instructional	Test	Total
I	Force and Motion	1.1 - 1.4	10	1	11
II	Vectors and Statics	2.1 - 2.2	12	1	13
III	Properties of Matter	3.1 - 3.4	11	1	12
IV	Periodic Motion and Waves	4.1 - 4.3	8	1	9
	TOTAL		**41**	**4**	**45**

COURSE OUTCOME

After the completion of the course student will be able to

* Differentiate different Physical quantities and its standard units.

* Understand concepts of force, Linear momentum, etc. which helps him to extend these concepts to Engineering mechanics.
* Solve fundamental problems in Mechanics related to force and its effects.

* Understand the fundamental principles of Rocket propulsion.

* Work with various vector algebraic tools which help to understand various concepts of Physics and technology.
* Acquire broad ideas about resultant force, moment of force and moment of a couple.etc. enables to perform vector operations and interpret the results geometrically and understand the applications in various Engineering branches.

* Understand basic ideas of different types of modulii of elasticity with special reference to Young's Modulus.
* Study concepts of technical terms such as stress, strain, elastic limit, elastic fatigue, plastic material etc
* Get an introductory idea of liquid flow with special reference to Bernoulli's theorem leading to its practical applications
* Impart basic ideas of viscosity and its practical applications

* Inculcate qualitative and quantitative knowledge of Simple Harmonic Motion.
* Contemplate basic concepts of wave motion and its characteristics leading to the understanding of various types of applications such as vibrations of air column.
* Recognise the characteristics of Ultrasonic sound and hence to apply the same in various applications in the field of Engineering and technology.

SPECIFIC OUTCOME

MODULE - I FORCE AND MOTION

1.1.0   Understand the concept of units and measurements.
1.1.1. Define Unit of a Physical quantity.
1.1.2. Explain the principle of measurement.
1.1.3. Identify fundamental and derived units.
1.1.4. Apply the dynamics of particles in practical situations.
1.1.5. Identify the vector and scalar quantities.
1.1.6. Derive the expression $S_n = u + a\,(n-½)$.
1.1.7. Solve problems related to gravity with equations of motion.
1.1.8   State Newton's laws of motion.
1.1.9   Define the terms force, Inertia, Momentum and Impulse.
1.1.10 Derive the relation $F = ma$.
1.1.11 State law of conservation of momentum and prove it in the case of two bodies making a collision .
1.1.12 Explain the principle behind the recoil of gun.
1.1.13 Solve problems related to laws of motion.

MODULE - II VECTORS AND STATICS

2.1.0   Understand the principles of statics and its applications.
2.1.1   Add vectors using triangle method.
2.1.2   Define Resultant and Equilibrant of vectors.
2.1.3   State Parallelogram law of forces.
2.1.4   Derive expression for resultant using Parallelogram law.
2.1.5   State the law of triangle of forces.
2.1.6   State Lami's theorem.
2.1.7   Explain moment of a force.
2.1.8   State the conditions of equilibrium of a rigid body acted upon by a large number of coplanar parallel forces.
2.1.9   Derive expression for work done by a couple.

MODULE - III PROPERTIES OF MATTER

3.1.0   Comprehend the concept of elasticity.
3.1.1   Define stress, strain, and elastic limit.
3.1.2   State Hooke's law.
3.1.3   Derive expression for Young's modulus, rigidity modulus, and bulk modulus.
3.1.4   Understand the term elastic fatigue.
3.1.5   Solve the problems related to modulus of elasticity.
3.1.6   Understand the principle of fluid flow.
3.1.7   Distinguish between Streamline and Turbulent flow.
3.1.8   Explain Pressure energy, Kinetic energy and Potential energy of a liquid.
3.1.9   Mention equation of continuity.
3.1.10 State Bernouille's theorem.
3.1.11 Explain the working of airfoil and atomizer.
3.1.12 Apply the principle of viscosity in solving problems.
3.1.13 Define coefficient of viscosity.
3.1.14 Give the Poiseusille's formula.
3.1.15 Explain terminal velocity.

3.1.16 Mention Stoke's formula.
3.1.17 Explain the effect of temperature on viscosity.
3.1.18 Solve problems using Poiseuille's formula.

MODULE - IV PERIODIC
4.1.1   Comprehend the concept of wave motion.
4.2.0   Define Simple Harmonic motion.
4.2.1   Derive equation for simple harmonic motion.
4.2.2   Explain period, frequency and amplitude.
4.2.3   Distinguish between transverse and longitudinal waves.
4.2.4   Define wavelength.
4.2.5   Derive the relation $v = f\lambda$
4.2.6   Explain resonance.
4.2.7   Distinguish between closed pipes and open pipes.
4.2.8   Calculate the velocity of sound using resonance column experiment.
4.2.9   Explain ultrasonic waves.
4.2.10 Mention applications of ultrasonic waves.

COURSE CONTENT

MODULE - I FORCE AND MOTION (11Hrs)

Physical Quantities – units - fundamental and derived units - SI System and its advantages- One dimensional motion- Scalar and vector quantities - speed- velocity- acceleration - recapitulation of equations of motion - derivation of the formula $S_n = u + a(n-\frac{1}{2})$ - motion under gravity - problems.

Force and motion - linear momentum - Newton's laws of motion - derivation of F = ma law of conservation of momentum - derivation - recoil of gun - expression for recoil velocity rocket propulsion - impulse - problems.

MODULE - II VECTORS AND STATICS (13Hrs)

Vectors and scalars- Triangle method of vector addition- Concurrent forces- Resultant and Equilibrant- parallelogram law –Derivation of resultant in magnitude and direction-Law of triangle of forces- Lami's theorem- Resolution of forces- Parallel forces- like and unlike parallel forces- moment of a force- conditions of equilibrium under the action of a number of coplanar parallel forces- couple-moment of a couple- work done by a couple- numerical problems.

MODULE - III PROPERTIES OF MATTER (12Hrs)

Elasticity – stress – strain - elastic limit. Hook's law - Young's modulus - rigidity modulus - bulk modulus – determination of Young's modulus by stretching - elastic fatigue – plastic – problems.

Fluid flow- streamline and turbulent flow- pressure energy, potential energy and kinetic energy of a liquid- equation of continuity –Bernoulli's theorem – applications- airfoil and atomizer.

Viscous force- coefficient of viscosity- Poiseulle's formula – Stoke's formula and experiments – Variation of viscosity with temperature – numerical problems

MODULE - IV PERIODIC MOTION AND WAVES (9Hrs)

Simple harmonic motion – definition – simple harmonic motion as projection of a uniform circular motion along the diameter of a circle – equation for simple harmonic motion – period, frequency, amplitude and phase –Examples of simple Harmonic Oscillators - problems.
Waves – longitudinal and transverse – relation between velocity, frequency and wavelength – free vibration, forced vibration and resonance – nodes and antinodes - vibration of air column in a tube – closed pipes – open pipes – end correction – resonance column experiment – variation of velocity with temperature – ultrasonic waves – production – applications - problems.

REFERENCE BOOKS

1. Resnick and Halliday   - Physics
2. D.S.Mathur   - Mechanics
3. Narayana Kurup   - Mechanics
4. A.Marikani   - Engineering Physics
5. H D Young   - University Physics

COURSE TITLE   : ENGINEERING CHEMISTRY I
COURSE CODE   :
COURSE CATEGORY : F
PERIODS PER WEEK : 3
PERIODS /SEMESTER : 45
CREDITS   : 3

TIME SCHEDULE

Module	Name of Module	Course Objective no.	Total periods per semester		
			Instructional	Test	Total
I	Atomic Structure-I, Nanochemistry and Catalysis	1.1 1.2 1.3	Theory : 13	1	14
			Practical		
II	Fundamental of analytical chemistry	2.1 2.2 2.3	Theory : 11	1	12
			Practical		
III	Water and its treatment.	1.1 1.2 1.3	Theory : 8	1	9
			Practical		
IV	Metals and Alloys	1.1 1.2 1.3	Theory : 9	1	10
			Practical		
TOTAL					45

COURSE OUTCOME

After the completion of the course, student will be able to

- Understand the concept of atom

- Prepare the students to learn the advanced level of Science and Technology like Nanotechnology.

- Relate the knowledge of basic chemistry in industrial applications like Catalysis

- Understand different concepts of acids and bases

- Analyse the physical concepts related to pH and develop the skill of solving problems

- Develop the ability to analyse, interpret and apply the fundamentals of analytical chemistry including the skill of solving problems

- Distinguish different types of water and hardness. Predict the methods of removal of hardness and apply the basic principles of chemistry behind it and apply the learned facts in real life situation.

- Differentiate between metals and alloys

- Apply the concept of metals and alloys in metallurgy.

<u>**SPECIFIC OUTCOME**</u>

 MODULE - I:
1.1.0 <u>ATOMIC STRUCTURES I, NANO CHEMISTRY AND CATALYSIS</u>
1.1.1.   Review the fundamental particles of atom
1.1.2.   Explain the terms nano materials and nanotechnology.
1.1.3.   Explain different methods of synthesis and applications of carbon nanotubes.
1.1.4.   Introduce different terms used in catalysis.

MODULE - II :
1.2.0 <u>FUNDAMENTALS OF ANALYTICAL CHEMISTRY</u>
1.2.1.   Recollect the ideas of acids and bases.
 1.2.2   Narrate the different definitions of acids and bases and compute equivalent weights
             of acids and bases.
1.2.3   Explain the terms Ionic product of water,ʹ pH, pOH and Buffer Solution and illustrate
             Calculation of pH and pOH.
1.2.4   Explain the strength of solution using molarity and normality.
1.2.5   Solve problems based on normality and molarity.
1.2.6   Explain different terms used in Volumetric analysis.
1.2.7   Understand the principle of volumetric analysis and Solve problems based
             on $N_1V_1 = N_2V_2$.

MODULE - III:
1.3..0   <u>WATER AND ITS TREATMENT</u>
1.3.1.   Understand soft and hard water- definition and causes
1.3.2   Distinguish between soft and hard water
1.3.3   Mention types of hardness
1.3.4   Explain methods of removal of hardness
1.3.5   Explain reverse osmosis and desalination of sea water

MODULE - IV:
1.4.0   <u>METALS AND ALLOYS</u>
1.4.1   Distinguish the different varieties of Iron with their properties
1.4.2   Explain different methods of heat treatments of steel
1.4.3   Introduce alloys and explain composition of alloys like brass, bronze, Duralumin
             and Solder
1.4.4   Explain Powder Metallurgy with different steps, uses, advantages and limitations

<u>CONTENT DETAILS</u>

<u>MODULE - I: Atomic Structure I, Nano Chemistry and Catalysis (13+1 = 14 hour</u>)

Definition of atom and molecule - Fundamental particles - Electron, Proton and Neutron. Their charge and mass - Atomic number, mass number.

Definitions of nano materials and nano technology – Applications of nano materials – Carbon nano tubes – Types of Carbon nano tubes – SWCNT and MWCNT – Synthesis, Properties and any five applications of Carbon nano tubes.
Catalysis – Definition of Catalyst – Terms – Positive Catalyst, Negative Catalyst, Promotors and poisons with one example each - Types of Catalysis – Homogeneous Catalysis and Heterogeneous Catalysis – Two example each (No mechanism is required).

MODULE - II: Fundamentals of Analytical Chemistry (11+1 = 12 hour)

Definitions of Acids and Bases – Arrhenius, Bronsted & Lowry and Lewis definitions – Conjugate acid – base pair with two examples – Basicity of acid and Acidity of base – Equivalent weights of acids and bases.

Ionic Product of water – pH and pOH scale Definition – relation between pH and pOH – Simple problems based on pH. Applications of pH – Buffer solution – definition – classification of Buffers – Acidic and Basic Buffers – Buffer Capacity (definition only).
Molarity and Normality – Definition and mathematical formulae – Simple problems based on molarity and normality – Volumetric analysis – Titration – end point – indicators – pH range of indicators – choice of indicators in titration – Principle of Volumetric analysis (Normality equation only). Simple problems based on normality equation.

MODULE - III: Water and its Treatment (8+1=9 hour)

Water - Physical properties of water – Soft water and hard water – Reasons of hardness – Types of hardness – temporary hardness and permanent hardness – removal of temporary hardness – Boiling and Clark's Process – Removal of permanent harness – Ion exchange process using Cation and Anion exchangers - Potable water – Characteristics and treatment with block diagram - Desalination of sea water – reverse osmosis.

MODULE - IV: Metals and Alloys (9+1=10 hours)

Physical properties of metals – Properties of Industrial metals like Cast Iron, Pig Iron, Wrought Iron and Steel (Manufacture is not required) – Effect of Impurity in Steel – Heat Treatment of Steel – Tempering, Quenching and Nitriding – Alloys – Definition – Purpose of making alloys – Preparation of alloys by fusion method (figure is required) – Composition of alloys like Brass, Bronze, Duralumin and Solder – Powder Metallurgy (1. Preparation of Metal Alloy by Atomization and Reduction. 2. Chemical Mixing or Blending. 3. Compacting. 4. Pre-Sintering. 5. Sintering.) and its uses, advantages and limitations.

REFERENCE:

Sl. No.	Name of Author	Title of Book	Name of Publisher
1	Jain and Jain	Engineering Chemistry	Dhanpat Rai and Sons
2.	S. S. Dara	Engineering Chemistry	S. Chand Publication
3.	B. K Sharma	Industrial Chemistry	Geol Publication
4.	S. S. Dara	Environmental Chemistry and Pollution Control	S. Chand Publication
5.		Wiley "All in One"	Wiley India Pvt. Ltd 2012 Editon.

COURSE TITLE	: HEALTH & PHYSICAL EDUCATION
COURSE CODE	:
COURSE CATEGORY	: C
PERIODS/WEEK	: 3 (1 Theory +2 Practical)
PERIODS/SEMESTER	: 45
CREDITS	: 2

Objective: The course intended to provide learning experience to students to realize the importance of physical fitness, health and well being. It will also help to develop life time physical activity behaviour among the students. The course will help,

1. To introduce the fundamentals of health, physical education, fitness and sports.
2. To provide knowledge and understanding regarding the scientific basis of fitness.
3. To enable the students to lead a healthy lifestyle based on concepts of fitness and wellness.
4. To impart knowledge regarding health and nutrition; and to equip the students to provide first aid measures and manages common injuries.

Health and Physical Education (Theory) – 15 Sessions

TIME SCHEDULE		
MODULE	**TOPIC**	**PERIODS**
I	Concept of Health and Physical Education	2
II	Introduction to fitness	6
III	First Aid	3
IV	Food and Nutrition	2
	Test	2
TOTAL		15

MODULE – I CONCEPT OF HEALTH AND PHYSICAL EDUCATION

a)   Health – Definition and spectrum of health
b)   Various aspects of health-physical health, mental health, social health, spiritual health
c)   Factors influencing health-Biological factors, environmental factors, socio-cultural factors, Personal factors.
d)   Physical Education - Meaning and definition, aims, objectives and importance of physical education

MODULE - II INTRODUCTION TO FITNESS

a)   Meaning and importance of physical fitness.
b)   Components of physical fitness-Health related and skill related fitness.
c)   Means of fitness development-aerobic and anaerobic activities, sports and games, yoga and recreational activities.
d)   Principles of use and disuse. Relationship between duration and severity of exercise – stitch, cramps. Oxygen debt and second wind

e) Posture- Meaning and concepts of posture, classification of posture- Endomorph, Ectomorph and Mesomorph, Dynamic postures- sitting,standing, walking, running, lying,- Postural deformities- Kyphosis, Lordosis, Scoliosis, Knock knee, Bow leg, Flat foot.

f) Health risk behaviours- Effects of Drugs, Alcohol, Smoking, Dietary abuse and Inactivity.

MODULE - III FIRST AID

a) Definition and purpose of first aid Principles and Ethics of First Aid
b) First Aid – General Procedure -first aid kit.
c) Wounds (types and its management)
d) Fractures (types and its management)
e) First aid for –burns, snake bite, drowning, unconsciousness, electric shock, chocking, sun stroke, bleeding.
f) Bandaging techniques
g) Techniques of carrying injured persons.
h) Cardiopulmonary resuscitation (CPR).

MODULE - IV FOOD AND NUTRITION

a) Classification of food
b) Calories and daily requirement of calories.
c) Balanced diet
d) Food pyramid
e) Caloric value of Indian foods

SUGGESTED READINGS

1) **AAPHERD**. *Health Related Physical Fitness test Mannual*.1980 published by association drive Reston Virginia
2) **ACSM** *Fitness Book*, Leisure Press Campaign, IIIinois,1996, Leisure Press , Canada
3) **ACSM'**s *"health related physical fitness assessment manual"* Lippincott Williams and Wilkins USA, 2005
4) **B.C. Rai** *Health Education and Hygiene,* published by Prakashan Kendra,Lucknow
5) **Corbin, Charles B.et.al, C.A.,(2004).** *Concepts of Fitness and Wellness,* Bosten:McGrawHill
6) **Fashey,TomasD,Insel, Paul M, and Roth, Walton T (2005)** *Fit and well,* New York: McGrawHill Inc.
7) **Greenberg, Jerold S and Dintiman George B (1997)** *welness- Creating a Life of Health and fines* London: Allyn and Bacon Inc.
8) **Norman Bezzant***Help First Aid for everyday emergencies,* JaicoPublishing House Bombay, Delhi
9) **Puri,K, Cahndra.,S,S, (2005).** *Health and Physical Education*. New Delhi: Surjeet Publication

Health and Physical Education (Practical) – 15 Sessions (2 Hours/session)		
PART- I	**COMPULSORY**	**09 SESSIONS**
1	Warming Up and warming down(Various Stretching and Rotation Exercises)	1
2	Aerobic dance and various flexibility exercises	1
3	Yoga – Pranayama – Surya Namaskar-Padmasana- Pachimothasana- Bhujangasana- Dhanurasana - Sarvangasana -Matsyasana- SalabhasanHalasana- Chakrasana- Vrikshasana- Padahastasana - Savasana	3
4	Weight Training – Biceps curls- Triceps curls- Lateral rise-Good morning- Wrist curl- Front press- Press behind the neck- Bench press- Upright rows- Leg presses- Half Squat-Full squat- Dumbbell exercises	2

5	Physical Fitness Test
	    1. 50 yard dash -- Speed
	    2. Standing Broad Jump-Leg Power
	    3. Sit-Ups (60 sec) -Abdominal strength
	    4. Shuttle Run(10mts x 4)-Agility
	    5. Pull –ups(M)Flexed arm hang(W) –Shoulder strength
	    6. 600 yard/walk-Endurance
		2

PART- II	**OPTIONAL**	**06 SESSIONS**
1	Students can opt any one activity from two disciplines suggested by the faculty subject to the availability of facilities at the college	3
2	1. Football, 2. Basketball, 3. Volleyball, 4. Shuttle Badminton, 5. Ball Badminton, 6. Kabaddi, 7. Cricket, 8. Table Tennis, 9. Track and Field	3

Assessment of Students

Health and Physical Education			
	Internal	**External**	**Total**
Theory	40	00	40
Practical	10	50	60

a) **Internal Assessment for Theory Course**

The weightage of internal continuous assessment marks for theory courses shall be as follows:-

SL.NO.	Criteria Component	Weightage (%)
1	Test papers	50
2	Assignment (Minimum 2)	25
3	Attendance	25

b) Internal Assessment for Practical Course

The weightage of internal continuous assessment marks for practical courses shall be as follows:-

SL. No.	Criteria Component	Weightage (%)
1	Physical Fitness Test	50
2	Sports and games performance	50

c) Assessment at End of Semester Examination (Practical Course)

1) The course teacher and an examiner appointed by the Principal shall conduct the practical examination at the end of the semester.

2) Award of marks for the semester practical examinations as follows:-

SL. No.	Criteria Component	Weightage (%)
1	Fair Record	40
2	Viva Voce	20
3	Performance in Yoga	20
4	Demonstration of Weight Training Exercises	10
5	Demonstration of Aerobics, Stretching, Rotation and Flexibility exercises	10

COURSE TITLE	: ENGINEERING GRAPHICS
COURSE CODE	:
COURSE CATEGORY	: F
PERIODS/ WEEK	: 5
PERIODS/ SEMESTER	: 75
CREDIT	: 0

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Introduction of engineering graphics Lettering, numbering and dimensioning	19
2	Geometric construction & Scales	21
3	Projections of points and lines	18
4	Projections of planes	17
	TOTAL	**75**

COURSE OUTCOME:

After the completion of the course, student will be able to
- o   Understand the importance of engineering graphics
- o   Recognise the use of drawing instruments, standards, symbols etc.
- o   Appreciate the lettering, numbering , dimensioning
- o   Recognise geometric construction & Scales
- o   Understand the projections of points ,lines etc.
- o   Understand the projections of planes

SPECIFIC OUTCOME:

MODULE - I

1.1.0   Understand the importance of engineering graphics
   1.1.1   Understand the importance of engineering graphics
   1.1.2   Explain the importance of engineering communication medium
   1.1.3   Describe the development of engineering graphics and computer aided drafting CAD
   1.1.4   Indicate the link between engineering graphics and other subjects of study in diploma courses

1.2.0   Recognise the use of drawing instruments
   1.2.1   Use engineering drawing instruments
   1.2.2   Select the proper instrument to draw horizontal, vertical and inclined lines

    1.2.3   Select the proper instrument to draw large and small circles and arcs to its specifications

    1.2.4   Select the proper pencil to draw different types of line according to its specifications

    1.2.5   Identify the steps to keep the drawing clean and tidy

1.3.0 Recognise the use of drawing standards, symbols etc
    1.3.1   Appreciate the standards of engineering drawing
    1.3.2   Select the drawing sheet
    1.3.3   Draw different types of lines
    1.3.4   Prepare title block as per BIS
    1.3.5   Fold drawing sheets as per standards

1.4.0 Appreciate the lettering & numbering
    1.4.1   Apply lettering and numbering
    1.4.2   Write drawing title using sloping and vertical lettering including numerals as per BIS
    1.4.3   Select suitable size of letters of different layout and applications
    1.4.4   Write engineering drawings notes using lettering

1.5.0 Appreciate the dimensioning
    1.5.1   Apply dimensioning as per standards
    1.5.2   State the need of dimensioning as per BIS specification
    1.5.3   Identify the notations used in a drawing as per BIS
    1.5.4   Identify the system of placement of the dimensions as per BIS
    1.5.5   Dimension of a given drawing according to BIS including features
    1.5.6   Apply the rules for dimensioning of standard features, given a drawing comprising of standard features
    1.5.7   Identify the principles of dimensioning, given a dimensioned drawing
    1.5.8   Identity the correctness of an engineering drawing dimensioned and dimension the same as per BIS

MODULE - II

2.1.0 Recognise Geometric construction
    2.1.1   Apply principles of geometrical construction
    2.1.2   Construct polygon, given the length of the side
    2.1.3   Insert a regular polygon in a circle.
    2.1.4   Define Ellipse, involutes, helix, Parabola, Hyperbola and Cycloid,
    2.1.5   Construct Ellipse by concentric circle, eccentricity, rectangular and parallelogram methods
    2.1.6   Construct an involute, helix, parabola from given data
    2.1.7   Identify the application of these constructions in engineering practice.

2.2.0 Recognise Scales
    2.2.1   Know about the importance of scale in Engineering Drawing
    2.2.2   Identify different types of Scales

3.1.0   Understand the projections of points & lines
   3.1.1   Understand the projection of points, lines and planes
   3.1.2   Project points in different quadrants
   3.1.3   Project lines parallel to both planes
   3.1.4   Project lines perpendicular to HP and || to VP
   3.1.5   Project lines perpendicular to VP and || to HP
   3.1.6   Project lines inclined to HP and || to VP
   3.1.7   Project lines inclined to VP and || to HP
   3.1.8   Project lines inclined to both planes - simple direct questions and answers
   3.1.9   Find true length of lines

MODULE - IV

4.1.0   Understand the projections of planes
   4.1.1   Project planes parallel to VP and perpendicular to HP
   4.1.2   Project planes parallel to HP and perpendicular to VP
   4.1.3   Project planes inclined to one plane and parallel to other

CONTENT DETAILS

MODULE - I

1.1 The Importance of Engineering Graphics
   Explanation of the scope and objective of this subject – its importance as a graphic communication- Computer Aided Drafting (CAD) need for preparing drawing as per BIS standards.

1.2 Drawing Instruments.
   Basic drawing instruments – T square – Set square – compass - dividers – drawing boards – Pencils – Drawing papers – Mini drafter – French curves – Stencils – Selection and mode of using them.

1.3 Drawing Standards
   Size of drawing sheets – Layouts of drawing sheet – Title Blocks – Types of lines – Folding of drawing sheets

1.4 Free hand Lettering and Numbering
   Need for legible lettering and numbering on drawings – selection of suitable size of lettering for different drawing writing of Engineering drawing titles and notes using both vertical and sloping styles.

1.5 Dimensioning

Function of dimensioning - need for dimensioning engineering drawing according to BIS – notation used in dimensions – dimension line – extension line – arrow heads and leader – system of dimensioning (method I and method II)

MODULE - II

2.1 Geometric construction
Construction of regular polygon given the length of its side - methods of inserting a regular Polygon in a given circle – construction of ellipse by different methods – eccentricity - concentric circle- rectangular and parallelogram. Definition of involute - helix - parabola & hyperbola – construction of cycloid- helix- involute and parabola.

2.2 Scales
Meaning of drawing to scale – reduced scale – enlarged scale – full size scale – types of scale – plain scales & diagonal scales – dividing a line into number of equal parts

MODULE - III

3.1 Projection of points- lines and planes
Projection of points in different quadrants-
Projection of straight lines(in first quadrant only) - parallel to one or both planes - parallel to one plane and perpendicular to other – inclined to one plane and parallel to other - inclined to both planes. Methods of finding true length and its inclination with the reference planes.

MODULE - IV

4.1 Projection of planes
Projection of planes (in first quadrant only) – perpendicular to both planes - parallel to one plane and perpendicular to other plane - inclined to one plane and perpendicular to the other plane

TEXT BOOKS

1. K. C Jon,   -   Engineering Graphics   - PHI Learning Private Limited
2. P. I. Varghese -   Engineering Graphics   - VIP Publishers

REFERENCE BOOKS

1. N D Bhatt   -   Engineering Drawing
2. Sageer& Abu   -   Engineering Graphics
3 M. B. Shah and B.C.Rana -   Engineering Drawing - Pearson Publications
4**.** T.Jayapoovan   -   Engineering Drawing & Graphics using Autocad – Vikas publications

COURSE TITLE   :   WORKSHOP PRACTICE
COURSE CODE   :
COURSE CATEGORY   : F
PERIODS/ WEEK   : 3
PERIODS/ SEMESTER(I & II): 90
CREDIT   : 3

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Carpentry, Foundry & Casting	27
2	Smithy, Forging & Fitting	27
3	Sheet metal	18
4	welding	18
	TOTAL	90

Course outcomes:

STUDENT WILL BE ABLE TO:

- Perform various exercises on given drawing and specifications in Carpentry shop, Foundry & Casting shop.
- Perform various exercises on given drawing and specifications in Smithy, Forging & Fitting shop.
- Perform various exercises on given drawing and specifications in Sheet metal shop.
- Perform various exercise on given drawing and specifications in Welding shop.

CONTENT DETAILS

MODULE I

Introduction, objectives, safety in the Carpentry shop, Foundry & Casting shop.
Familiarization of tools
Marking and measuring tools such as straight edge- meter square- try square- bevel square- combination square- marking knife- marking gauge- mortise gauge- cutting gauge- wing compares- trammel- divider- outside and inside calipers- spirit level and plumb bob.
Cutting tools such as Rip saw- Cross cut saw- panel saw- tenon saw- bow saw- compass saw- key hole saw- firmer chisel- bevel edge firmer chisel- parting chisel- mortise chisel- jack plane- wooden and metal- trying plane- smoothening plane- rebate plane- plough plane- router plate- spoke shave.
Boring tools such as Bradawl ratchet brace- wheel brace- shell bit- fostries bit- counter sunk bit.
Striking tools such as mallet etc
Holding devices – Bench vice- bench stop- sash clamp- G-clamp- hard screw.
Miscellaneous tools – Rasp cut file- scraper- glass paper- pincers- ratchet and cabinet type screw drivers.
Carpentry Practice
Marking- sawing- planning- chiseling- grooving- rebating exercises Preparation of carpentry joints.
Familiarization of Foundary tools
Hand tools – shovel- riddle- hammers- trowels- relic- lifters- strike off bar spruce- balloons- swab- gate cutter- mallet- vent rod- draw spike- lifting plate- pouring weight- gaggers- clamps, core & chaplets.
Moulding practice & casting

Preparation of moulding sand- Prepare moulds of different types using different patterns(single, double & three piece patterns)- ferrous & Non- ferrous metal casting using simple patterns.

MODULE II

Familiarization of Smithy tools

Hand tools – anvil- swage block- hammers such as ball peen- straight peen- cross peen and sledge hammers.Tongs such as flat- hallow- cold and hot chisels- swages- fullers- flatters- set hammers- pinch and drift.

Equipment: Open and closed hearth- heating furnaces- hand and power driven blowers- open and stock fire fuels such as charcoal- coal- oil and gas

Smithy & Forging Practice

Building fire in the furnace- Upsetting- bending- drawing- setting down- pinching- cutting and welding exercises

Familiarization of fitting tools

Hand tools & Marking tools – scriber- compass- dividers- outside and inside calliper- jenny calliper- ordinary scribing block- universal scribing block- angle plate- V-block- center punch- prick punch- try square- bevel square- surface plate- straight edge.

Cutting tools – chisels – flat- crosscut- half round- diamond point- side chisel. Files – single cut and double cut files rough- bastard- second cut- smooth Dead smooth files – flat- square- pillar- round triangular- half round- knife- safe edge and needle files.

Scribers – Neck saw – solid and adjustable frames – blades – cutting with point rack saw

Striking tools: ball peen- straight peen- cross peen and double-faced hammers

Holding devices-vice-bench- leg- pipe- hand- pin and tool makers vice

Marking tools – scriber – ordinary and universal scribing block- center and prick punch.

Angle plate- v-block- Try Square- surface plate

Fitting Practice

Cutting - filing- scribing and simple joints exercises

MODULE III

Familiarization of Sheet metal tools

Understand safety precautions.

Familiarization of sheet metal tools – scribers- dividers- trammel points- set square- punches – prick Punches- centre punches – hand Grover- rivet- set- chisels hammers- riveting hammers- ball peen hammers – mallet- snip- shears- pliers- hand reamers (tongs) files- stakes. Measuring instruments in sheet metal folding rule- common rule- steel circumference rule- vernier calipers- micrometer- calipers- thickness gauges (SWG) sheet metal gauge.

Practice work

Sheet cutting- development- folding- bending and pipe bending- making right angle joints.

MODULE IV

Familiarization of welding tools & safety

Safety precautions- Study of various tools and equipments used in the welding shop for both arc welding and gas welding.

   Practice work
   1.D.C. arc welding
   2.A.C. arc welding
   3.Gas welding

4. Edge preparation of welded joint such as V and double V.
 5.Horizontal -flat and vertical joints

General Information:

Examination in the Second Semester

TEXT BOOKS

1. **Mechanical Workshop Practice By K. C Jon, PHI Learning Private Limited**

2. **Mechanical Workshop & Laboratory Manual By K. C. John**

REFERENCE BOOKS

1. **S K Hajra Choudhary   -   Workshop Technology Vol. I**

2. **S K Hajra Choudhary   -   Workshop Technology Vol. II**

COURSE TITLE   : COMPUTING FUNDAMENTALS (PRACTICAL)
COURSE CODE   :
COURSE CATEGORY   : C
PERIODS/WEEK   : 5 (2 THEORY+ 3 PRACTICAL)
PERIODS/SEMESTER   : 75
CREDITS   : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Computer Fundamentals – Hardware and Software	14
2	Office Automation Tools	14
3	Basic Programming Concepts	22
4	Introduction to programming using python	25
	Total	**75**

COURSE OUTCOME:

On completion of the course the student will be able :

- Understand Computer Fundamentals – hardware and Software

- Understand computer networks

- Study Office automation tools

- Email and search engines

- Basic Programming Concepts

- Introduction to programming in Python

SPECIFIC OUTCOME

MODULE - I TO UNDERSTAND THE COMPUTER FUNDAMENTALS – HARDWARE AND SOFTWARE

    1.1.1   Identify computer hardware and software (in the lab)

    1.1.2   Draw and explain the block diagram of computer system

    1.1.3   Demonstrate various peripherals and their applications.

    1.1.4   Demonstrate the usage of various storage devices (data copying, CD/DVD burning)

    1.1.5   Illustrate the booting procedure (using windows and linux)

    1.1.6   Identify various operating system file management commands (create, copy, move, delete and rename folders and files)

    1.1.7   Demonstrate installation of application software (in windows and linux)

    1.1.8   Identify various computer languages

    1.1.9   Differentiate the compiler and interpreters

    1.1.10 State computer networks and internet**.**

MODULE - II TO APPLY OFFICE AUTOMATION TOOLS

    2.1.1   Demonstrate how a document to be prepared and formatted

    2.1.2   Demonstrate how a spread sheet to be prepared and calculations are performed

    2.1.3   Demonstrate how presentations are prepared.

    2.1.4   Demonstrate how to create email-id and uploading and downloading files.

MODULE - III TO UNDERSTAND BASIC PROGRAMMING CONCEPTS

    3.1.1   Identify various problem solving steps

    3.1.2   Design algorithm and flowchart for simple sequential problems.

    3.1.3   Design algorithm and flowchart for control structures (decision making and iterative)

MODULE - IV TO DEVELOP PROGRAMS USING PYTHON

    4.1.1   Demonstrate output functions and input function for a simple application

    4.1.2   Modify the applications with inserting control logic (if, else, elif)

    4.1.3   Modify the applications with inserting looping control(while, for)

    4.1.4   Write programs for a simple total/average mark calculation and calculation of grade based on boundary conditions**.**

CONTENT DETAILS

List of Experiments :

1. Identify the internal and external hardware/peripheral components
2. Familiarisation with operating system along with file management commands like create, copy, move, delete and rename files and folders.
3. Prepare and print Bio-data with a covering letter using word processor.
4. Calculation of Total mark, grade based on boundary conditions for n number of students using Spread sheet.
5. Experiments for burning the contents in to optical disks.
6. Preparation of presentation (with transition and animations , insertion of scanned images and internet contents)
7. Email id creation, sending and receiving of email with attachments.
8. Programs to calculate average of 3 numbers, area of triangle, volume of cylinder, Temperature conversion.
9. Largest of 3 numbers, Check whether even or odd, Roots of quadratic equation, Character name of the day.
10. Print natural numbers, Factorial value, Multiplication table, Sum of digits, Sum of a set of numbers, calculation of grade based on boundary conditions

Text Book(s):

1. Rajaraman V. - Fundamentals of Computers - PHI

References:

1. Mrs. Chetna Shah & Mr. Kalpesh Patel - Open Office

COURSE TITLE   : **ENGINEERING SCIENCE LAB (For Semester I & II)**
                                             [Engineering Physics & Engineering Chemistry Lab]
COURSE CODE   :
COURSE CATEGORY   : **F**
PERIODS PER WEEK   : **3**
PERIODS /SEMESTER (I & II): 90
CREDITS   : **3**

ENGINEERING PHYSICS LAB

TIME SCHEDULE

SL.No	Name of module	Course objective	Total period in 1 and 2 semester		
			Instructional	Test	Total
1	Measurement and calculation of different physical quantities	1:1 1:2 1:3	Practical: 42	3	45
Total periods 1 and 2 semester 45					

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

1.   To measure volume of a cylinder using vernier calipers.
2.   To measure volume of a wire using screw gauge.
3.   To determine focal length of a convex lens by displacement method.
4.   To determine the velocity of sound in air at room temperature using resonance column.
5.   To determine spring constant using Hooke's law..
6.   To determine acceleration due to gravity using simple pendulum.
7.   To verify law of resistances.
8.   To determine specific resistance of material using Meter Bridge.
9.   To determine Internal Resistance of a Primary Cell using Potentiometer.
10.   To plot characteristics of photoelectric cell (photoelectric current vs intensity of light and voltage applied)
11.   To determine the mass of the given body using moment bar.
12.   To determine the mass of a body by parallelogram method and by Lami's theorem.
13.   To verify Ohm's law and to determine the resistance of the given wire.
14.   To determine the coefficient of viscosity of a highly viscous liquid.
15.   To determine the relative density using U- tube apparatus.

LIST OF PRACTICAL EXPERIMENTS – PHYSICS
1. Vernier calipers
2. Screw gauge
3. Convex lens
4. Resonance column
5. Hooke's law
6. Simple pendulum
7. Law of resistances
8. Meter bridge
9. Potentiometer
10. Photoelectric cell
11. Moment bar
12. Concurrent forces(mass of the body)
13. Ohm's law
14. Stoke's method for viscosity
15. U tube

ENGINEERING CHEMISTRY LAB

TIME SCHEDULE

SL.No	Name of module	Course objective	Total period in 1 and 2 semester		
			Instructional	Test	Total
1	Quantitative analysis(Volumetric analysis)	1:1 1:2 1:3	Theory: Practical: 39	- 6	45
Total periods 1 and 2 semester 45					

On completion of the course the student will be able to:
Practical Volumetric Analysis

Single Titration
1. Standardisation of HCL
2. Standardisation of NaOH Double Titrations
3. Estimation of NaOH
4. Estimation of KOH
5. Estimation of Na2 CO3
6. Estimation of K2 CO3
7. Estimation of HCl

8.   Estimation of HNO3
9.   Estimation of H2 SO4
10.   Estimation of Oxalic acid
11.   Standardisation of KMnO4
12.   Estimation of Oxalic acid
13.   Estimation of Fe 2+ ion
14.   Estimation of Mohr's Salt
15.   Determination of PH of Solution
16.   Estimation of Zinc using EDTA
17.   Estimation of Magnesium Using EDTA

Reference:

Prof. A. O. THOMAS – PRACTICAL CHEMISTRY – Eight Edition 2000

Semester II

	COURSE TITLE	: English for Communication - II

COURSE TITLE   : **English for Communication - II**
COURSE CODE   :
COURSE CATEGORY   : **F**
PERIODS/WEEK   : **4**
PERIODS/SEMESTER   : **60**
CREDITS   : **3**

MODULE	TOPICS	PERIODS
1	Relationships	15
2	Inspirations	15
3	Mysteries	15
4	Innovations	15
	TOTAL	**60**

COURSE OUTCOME: To develop the four basic skills in English and use them effectively in day-to-day life.

SPECIFIC OUTCOME:

       After completing the course the student will be able to:

- o Read articles, essays and technical writings of various kinds and develop comprehension about the message, images, thoughts and ideas contained in these articles.
- o Read short stories, poems, conversations and develop aesthetic sense and humanitarian ethos.
- o Read various prose passages and develop skills in skimming and scanning.
- o Understand the meaning of words used in passages by guessing meaning from the context.
- o Develop curiosity about the different topics of current interest and express points of view.
- o Familiarise themselves with different techniques of writing and use them effectively in business correspondences.
- o Group and sequence ideas and exploit the potentials of cohesion and coherence.
- o Acquire proficiency in correct usage of English words.
- o Internalise correct pronunciation and use them in daily conversation.
- o Develop communication skills by taking part in group discussions and present their views in a logical and convincing way.
- o Learn different language functions like agreeing, permitting, apologizing, negating and the like and use them effectively in daily communication.
- o Identify the different study skills and use them to improve their academic performance.

CONTENT DETAILS

MODULE - I

1. Reading passage - Relationships.
2. Vocabulary – Vocabulary acquisition through dictionaries.
3. Grammar – Connectors.
4. Writing – Letter Writing.
5. Language Function – Expressing one's opinion/Expressing likes & dislikes.
6. Speaking – Seminar Presentations.

MODULE - II
1. Reading passage - Inspirations.
2. Vocabulary – Vocabulary acquisition through developing reading skills.
3. Grammar – Using relative clauses.
4. Writing – Notices, Memos, Short Messages.
5. Language Function – Granting leave, Interrupting
6. Speaking – Attending Interviews.

MODULE - III
1. Reading passage - Mysteries.
2. Vocabulary – Learning words by association.
3. Grammar – Passive Voice.
4. Writing – Process Writing.
5. Language Function – Asserting/Making Suggestions.
6. Speaking – Conducting Meetings – Short Speeches.

MODULE - IV
1. Reading passage - Innovations.
2. Vocabulary – Confusing Words, Homophones.
3. Grammar – Reported Speech.
4. Writing – E-mails.
5. Language Function – Saying goodbye, Offering help.
6. Speaking – Describing the working of a machine.

PRACTICAL

Two hours are set apart for practical training in the use of English language. Here, stress is given to skills of listening and speaking. Accuracy and fluency are the two factors which are needed for our students. Practical sessions are intended to equip the learner to meet the everyday demand of the industry. Activities that can be used in the practical sessions are enlisted:

Speaking activities – Speaking with a friend, speaking to an audience, role play, group discussion, Just a Minute (JAM), Sharing of experience and ideas, Impromptu speeches.

REFERENCE: - G (A Coursebook in English for Polytechnic College
Students – Semester II)

COURSE TITLE	: **ENGINEERING MATHEMATICS – II**
COURSE CODE	**:**
COURSE CATEGORY	**: F**
PERIODS/WEEK	**: 6**
PERIODS/SEMESTER	**: 90**
CREDITS	**: 6**

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	VECTOR ALGEBRA	14
	BINOMIAL SERIES	10
2	DETERMINANTS	8
	MATRICES	14
3	INDEFINITE INTEGRALS	10
	DEFINITE INTEGRALS	8
4	APPLICATIONS OF INTEGRATION - AREA & VOLUME	6
	DIFFERENTIAL EQUATIONS	10
5	TESTS, ASSIGNMENTS AND TUTORIALS (4 Periods per Unit)	10
	TOTAL	**90**

SPECIFIC OUTCOME

MODULE - I VECTOR ALGEBRA AND BINOMIAL THEOREM.

1.1.0   Vector Algebra
   1.1.1   Scalar and vector quantities.
   1.1.2   Definition of a vector.
   1.1.3   Representation of vectors.
   1.1.4   Name a directed line segment as a vector.
   1.1.5   Different types of vectors.
   1.1.6   Addition and subtraction of vectors in terms of the segment.
   1.1.7   Position vector of a point with reference to a point.
   1.1.8   Difference of two vectors with same initial point as position vector of a point.
   1.1.9   Orthogonal Cartesian axes ,the unit vectors i, j and k .
   1.1.10 Types of vector product (a) scalar product (b) vector product
   1.1.11 Scalar (dot) product and vector (cross) product.
   1.1.12 Properties of dot product and cross product (no proof)
   1.1.13 Simple problems to find
         (i)   Work done by a force (application of scalar product)
         (ii) Moment of a force (application of vector product)

1.2.0 Binomial Theorem.

    1.2.1   Concept of factorial

    1.2.2   Meaning of nc_r and value of nc_r (No proof and no problems)

    1.2.3   Use of nc_r in the expansion $(x + a)^n$, where n is positive integer.

    1.2.4   State binomial theorem for a positive integer.

    1.2.5   Expansion of $(x + a)^n$,and $(x - a)^{n}$ where n is positive integer. (Statement only).

    1.2.6   General term of the expansion of $(x + a)^n$,and $(x - a)^{n}$

    1.2.7   Properties of binomial expansion

    1.2.8   Problems of the following types

        1.2.8.1   Expand using Binomial theorem

        1.2.8.2   Find a particular term in the expansion

        1.2.8.3   Find middle term(s)

        1.2.8.4   Find the coefficient of x^n

        1.2.8.5   Find constant terms in $(x + a)^n$,and $(x - a)^n$

MODULE - II DETERMINANTS AND MATRICES.

2.1.0 DETERMINANTS.

    2.1.1   Definition of determinant by means of algebraic expression

    2.1.2   Order of a determinant

    2.1.3   Evaluation of determinants of 2nd & 3rd order --- problems.

    2.1.4   Solution of a system of simultaneous linear equations in two unknowns

    2.1.5   Solution of a system of simultaneous linear equations in three unknowns

2.2.0 MATRICES.

    2.2.1   Definition of matrices

    2.2.2   Order of matrices

    2.2.3   Different types of matrices

    2.2.4   Algebra of matrices such as

        Equality of matrices

        Addition of matrices

        Subtraction of matrices

        Scalar multiplication and Multiplication

    2.2.5   Problems on algebra of matrices

    2.2.6   Transpose of a matrix

    2.2.7   Symmetric and skew-symmetric matrices

    2.2.8   Determinant associated with a square matrix

    2.2.9   Singular and non singular matrices

    2.2.10 Minors and cofactors

    2.2.11 Cofactor matrix

    2.2.12 Adjoint of a matrix

    2.2.13 Inverse of a matrix

    2.2.14 Solution of a system of three linear equations in two unknowns
           using the inverse of the coefficient matrix.

MODULE - III INTEGRAL CALCULUS.

3.1.0 INTEGRAL CALCULUS.
    3.1.1   Integration as reverse process of differentiation
    3.1.2   List standard integrals.
    3.1.3   Rules of integration.

$$1. \int kf(x)dx = k \int f(x)dx. \qquad 2. \int \{f(x) \pm g(x)\}dx = \int f(x)dx \pm \int g(x)dx$$

    3.1.4   Simple problems using standard results and rules of integration.
    3.1.5   Simple problems using algebraic simplification and trigonometric results.
    3.1.6   Integration by substitution method.
    3.1.7   Solve simple problems on substitution method
    3.1.8   Evaluation of integrals of the form

        (1) $\int x^{n-1} f(x^n)\, dx$ 2) $\int \emptyset[f(x)]\, f(x)dx$

        3) $\int f(x^n) f(x)\, dx$ 4) $\int \frac{f(x)}{f(x)} dx$ 5) $\int f(ax+b)dx$

    3.1.9   Integration by parts.
    3.1.10 Solutions of problems of the type x sinx, x^2 cos x, (ax + b) e^x, x $\sin^2$x, log x,
            e^x sinx, x log x etc.,

3.2.0 DEFINITE INTEGRALS.
    3.2.1   Meaning of $_a\int^b$ f(x) dx and definition of definite integral.(Correct notation)
    3.2.2   Properties of definite integrals.
    3.2.3   Problems of the same type as in indefinite integral using limits of integration.

MODULE – IV APPLICATIONS OF INTEGRATION

4.1.0 AREA AND VOLUME
    4.1.1   Formulae for finding area bounded by a curve and volume of a solid of
           revolution (no proof)
    4.1.2   Estimation of the area bounded by the curve y = f(x), the x- axis and the
           ordinates at x=a and x=b
    4.1.3   Estimation of the area bounded by the curve y = f(x), and the x- axis
    4.1.4   Estimation of the area enclosed between two curves $y_1 = f_1(x)$, and $y_2 = f_2(x)$
    4.1.5   Simple problems to find the volume of solid of revolution.

4.2.0 DIFFERENTIAL EQUATIONS.

    4.2.1   Definition of differential equation with examples
    4.2.2   Order and Degree of D E with examples.
    4.2.3   Solution of D E by variable separable method.
    4.2.4   Problems on variable separable method.
    4.2.5   Solution of a linear D E of the type $\dfrac{dy}{dx} + Py = Q$
    4.2.6   Simple problems

4.2.7   Solution of D E of the type $\dfrac{d^2 y}{dx^2} = f(x)$

4.2.8   Simple problems

CONTENT DETAILS

1.1 Vector Algebra

Scalar and vector quantities, Definition of a vector, Representation of vectors, Name a directed line segment as a vector, Different types of vectors, Addition and subtraction of vectors in terms of the segment, Position vector of a point with reference to a point, Difference of two vectors with same initial point as position vector of a point, Orthogonal Cartesian axes ,the unit vectors i, j and k , Types of vector product (a) scalar product (b) vector product, Scalar (dot) product and vector (cross) product, Properties of dot product and cross product (no proof), Simple problems to find (i) work done by a force (application of scalar product) (ii) moment of a force (application of vector product).

1.2 Binomial Theorem

Concept of factorial , Meaning of nc r   and value of ncr (No proof and no problems), Use of ncr in the expansion (x + a)n , where n is positive integer, State binomial theorem for a positive integer, Expansion of (x + a)n ,and (x - a)n   where n is positive integer(statement only), General term of the expansion of (x + a)n ,and   (x - a)n, Properties of binomial expansion, Problems of the following types (a) expand using Binomial theorem, (b) to find a particular term in the expansion, (c) to find middle term(s), (d) to find the coefficient of x^n , to find constant terms in (x + a)n ,and (x - a)n,

MODULE - II Determinants and Matrices

2.1 Determinants
Definition of determinant by means of algebraic expression , Order of a determinant, Evaluation of determinants of 2nd & 3rd order --- problems, Solution of a system of simultaneous linear equations in two unknowns, Solution of a system of simultaneous linear equations in three unknowns

2.2 Matrices

Definition of matrices, Order of matrices, Different types of matrices, Algebra of matrices such as Equality of matrices, Addition of matrices, Subtraction of matrices, Scalar multiplication and Multiplication, Problems on algebra of matrices, Transpose of a matrix, Symmetric and skew-symmetric matrices, Determinant associated with a square matrix, Singular and non singular matrices, Minors and cofactors, Cofactor matrix, Adjoint of a

matrix, Inverse of a matrix, Solution of a system of three linear equations in two unknowns , Using the inverse of the coefficient matrix.

MODULE - III

3.1 Integral Calculus

Integration as reverse process of differentiation, List standard integrals, Rules of integration,

$$1. \int kf(x)dx = k\int f(x)dx. \qquad 2. \int \{f(x) \pm g(x)\}dx = \int f(x)dx \pm \int g(x)dx$$

Simple problems using standard results and rules of integration, Simple problems using algebraic simplification and trigonometric results, Integration by substitution method, Solve simple problems on substitution method, Evaluation of integrals of the form,

(1) $\int x^{n-1} f(x^n)\, dx$ 2) $\int \emptyset[f(x)] f'(x)dx$ 3) $\int f(x^n)f'(x)\, dx$ 4)

$\int \dfrac{f'(x)}{f(x)} dx$ 5) $\int f(ax+b)dx$

Integration by parts, Solutions of problems of the type x sinx, x^2 cos x, (ax + b) e^x, x $\sin^2 x$, log x, e^x sinx, x log x etc.

3.2 Definite Integrals

Meaning of $\int_a^b f(x)$ dx and definition of definite integral.(Correct notation), Properties of definite integrals, Problems of the same type as in indefinite integral using limits of integration.

MODULE - IV

4.1 Area and Volume

Formulae for finding area bounded by a curve and volume of a solid of revolution (no proof), estimation of the area bounded by the curve y = f(x), the x- axis and the ordinates at x=a and x=b, Estimation of the area bounded by the curve y = f(x), and the x- axis , Estimation of the area enclosed between two curves $y_1 = f_1(x)$, and $y_2=f_2(x)$, Simple problems to find the volume of solid of revolution.

4.2 Differential Equations

Definition of differential equation with examples, Order and Degree of D E with examples,

Solution of D E by variable separable method, Problems on variable separable method,

Solution of a linear D E of the type $\dfrac{dy}{dx} + Py = Q$, Simple problems, Solution of D E of the

type $\dfrac{d^2 y}{dx^2} = f(x)$, Simple problems

NB: Emphasis is mainly placed in application oriented problems and hence proofs and derivations are not expected.

TEXT BOOK:

Engineering Mathematics-II for polytechnic colleges by different authors.

REFERENCE BOOK:

1. W.R Neelakanta   -   Applied Mathematics – Sapna Publications.

2. Dr. D S Prakash   -   Applied Mathematics – S Chand Publications

3. Calculus : One-Variable calculus Vol-I, 2edn. - Apostol,WILEY

COURSE TITLE   : ENGINEERING PHYSICS II
COURSE CODE   :
COURSE CATEGORY   : F
PERIODS PER WEEK   : 3
PERIODS /SEMESTER   : 45
CREDITS   : 3

TIME SCHEDULE

Module	Name of Module	Course Objective Number	Total periods per Semester		
			Instructional	Test	Total
I	Circular Motion and Rotational Dynamics.	1.1 - 1.4	12	1	13
II	Gravitation and Satellites.	2.1 - 2.6	8	1	9
III	Electromagnetism	3.1 - 3.3	12	1	13
IV	Modern Physics	4.1 - 4.9	9	1	10
	TOTAL		**41**	**4**	**45**

COURSE OUTCOME

After the completion of the course student will be able to:

- Create a clear cut understanding of various aspects of circular motion which is relevant to Engineering Science.

- Explain the Banking of roads and rails.

- Know the idea of a rigid body and its motion. It will impart the meaning of technical terms such as Moment of Inertia, Radius of gyration, axis of rotation, angular momentum and torque. He can also estimate various energies associated with rotation.

- Apply Equations of Translational and rotational motion in analysing rolling without slipping.

- Gather detailed ideas of Gravitational force and Acceleration due to gravity.
- Conceive introductory knowledge of different types of satellites.
- Derive technical terms such as Orbital velocity, Period, escape velocity of Satellites.
- Study orbital features of geostationary Satellites and its uses in everyday life.

- Study the orbital features of Polar Satellites and the uses of polar satellites.
- Get an overview of other types of satellites.
- Apply basic laws of Electricity and magnetism to solve simple problems concerning the motion and distribution of charges.
- Analyse complicated electrical circuits and find out currents through different branches and resistances in the circuit.
- Design simple electrical instruments using magnetic effect of electric current and understand how those devices can be used as multi range ammeters and voltmeters.
- Get basic ideas of the nature of light with special reference to quantum theory.
- Study quantitatively as well as qualitatively photoelectric effect.
- Derive Einstein's photoelectric electric equation.
- Get an overview of applications of photoelectric effect in various fields
- Understand the working of a Laser with special reference to Ruby laser, He-Ne gas laser and solid state laser with their merits and demerits.
- Introduction to various applications of Laser including communication.
- Create an awareness of nuclear fission and the working of nuclear reactors.
- Gather an introductory knowledge of nuclear fusion with special reference to energy production in stars.
- Impart an idea of alternative forms of energy sources.

SPECIFIC OUTCOME

MODULE - I   2.1 CIRCULAR MOTION AND ROTATIONAL DYNAMICS

2.1.1.   Understand the concept of circular motion.
2.1.2.   Define angular displacement and angular velocity.
2.1.3.   Derive the relation between linear velocity and angular velocity.
2.1.4.   Mention the expression for centripetal acceleration.
2.1.5.   Apply the Principle of centripetal force in the case of   banking of roads and rails.
2.1.6.   Solve the problems related to centripetal force.
2.1.7.   Understand the dynamics of rotating body.
2.1.8.   Define the moment of inertia of a rigid body.
2.1.9.   Define radius of gyration.
2.1.10.   State theorems of parallel and perpendicular axes.
2.1.11.   Define torque.
2.1.12.   Mention the relation between torque and angular momentum.
2.1.13.   Mention the expression for kinetic energy of rotation.
2.1.14.   Derive the expression for moment of inertia of a uniform circular disc about an axis passing through its centre and perpendicular to its plane.

2.1.15.   Derive expression for kinetic energy of a disc rotating on a horizontal plane.

2.1.16.   Solve problems using above expressions.

MODULE – II   2.2 GRAVITATION AND SATELLITES

2.2.1.   State Newton's law of gravitation.

2.2.2.   Derive expression for orbital velocity, Period of satellite.

2.2.3.   Define gravitational potential.

2.2.4.   Mention expression for escape velocity.

2.2.5.   Understand the idea of satellites.

2.2.6.   Explain geostationary satellites and polar satellites.

2.2.7.   Mention applications of geostationary and polar satellites.

MODULE - III   2.3 ELECTROMAGNETISM

2.3.1.   Understand the terms electric charge and potential difference.

2.3.2.   State Ohm's law

2.3.3.   Explain the terms resistivity and conductivity.

2.3.4.   Understand the law of resistances.

2.3.5.   Understand the fundamentals of electricity and its magnetic effect .

2.3.6.   State Kirchoff's laws.

2.3.7.   Derive expression for balancing condition of wheatstone's Bridge.

2.3.8.   State Biots and Savart's law.

2.3.9.   Mention the expression for magnetic field due to current through a circular coil.

2.3.10.   State Fleming's left hand rule.

2.3.11.   Describe the principle and construction of a moving coil galvanometer.

2.3.12.   Explain the conversion of galvanometer into ammeter and voltmeter

2.3.13.   Solves problems based on the above laws.

MODULE - IV   2.4 MODERN PHYSICS

2.4.1.   Understand laser action and its applications.
          Explain population inversion, spontaneous emission, stimulated mission and optical pumping.

2.4.2.   Write down the characteristics of Laser.

2.4.3.   Describe various applications of Laser.

2.4.4.   Explain the working of Ruby Laser, He –Ne laser.

2.4.5.   Understand the advantage of gas laser over solid state laser.

2.4.6.   Comprehend the theories of photoelectric effect

2.4.7.   Describe Max plank's quantum theory.

2.4.8.   Explain Photoelectric effect and application(photoelectric cell)

2.4.9.   State Laws of Photoelectric emission.

2.4.10.   Derive Einstein's photoelectric equation.

2.4.11.   Solve problems using the above equation.

2.4.12.   Understand nuclear fission and explain the working of nuclear reactors.

2.4.13.   Understand nuclear fusion and explain the energy production in stars.

CONTENT DETAILS

MODULE – I CIRCULAR MOTION AND ROTATIONAL DYNAMICS (13Hrs)

Angular displacement – angular velocity – angular acceleration – relation between linear velocity and angular velocity in circular motion – centripetal acceleration – centripetal force – banking of roads and rails – problems.

Rigid body – centre of mass - moment of inertia – radius of gyration – statement of parallel and perpendicular axes theorems – derivation of moment of inertia of a disc about an axis passing through the centre and perpendicular to its plane – angular momentum and torque – relation between torque and angular momentum (only expression) – rotational kinetic energy – kinetic energy of a disc rolling on a horizontal surface – problems.

MODULE- II GRAVITATION AND SATELLITES (9Hrs)

Newton's law of gravitation- Expression for acceleration due to gravity- Factors affecting the value of g- variation of acceleration due to gravity- satellites- Artificial satellites- orbital velocity and period of a satellite-gravitational potential –escape velocity- geostationary satellites and it's uses- polar satellites and it's uses - uses of artificial satellites

MODULE - III ELECTROMAGNETISM (13Hrs)

Electric charge – potential difference – Ohm's law – verification of Ohm's law – resistivity – conductivity – law of resistances – Kirchhoff's laws – Wheatstone's Bridge – Metre Bridge-magnetic effect of electric current—Biot-savart law-magnetic field due to a current carrying conductor- force on a current carrying conductor placed in a magnetic field- Moving Coil Galvanometer and its working – shunt- conversion of a galvanometer into an ammeter - conversion of a galvanometer into a voltmeter – problems.

MODULE - IV   MODERN PHYSICS (10Hrs)

Quantum theory – photoelectric effect – experiment to illustrate photoelectric effect – laws of photoelectric effect – Einstein's photoelectric equation – applications of photoelectric effect – problems.

Laser – principle of laser – characteristics – Ruby laser and its working–gas laser – Helium Neon gas laser and its working – advantages of gas laser over solid state laser – applications of laser.

Nuclear fission – chain reaction – nuclear reactor and its working – uses – nuclear fusion.- alternative forms of energy sources.

REFERENCE BOOKS

1. Resnick and Halliday   -   Physics
2. D.S.Mathur   -   Mechanics
3. Narayana Kurup   -   Mechanics
4. Murukesan   -   Modern Physics
5. A.Marikani   -   Engineering Physics
6. M N Avadhanulu   -   An Introduction to Lasers- Theory and Applications
7. H D Young   -   University Physics

COURSE TITLE : ENGINEERING CHEMISTRY - II
COURSE CODE :
COURSE CATEGORY : F
PERIODS PER WEEK : 3
PERIODS /SEMESTER : 45
CREDITS : 3

TIME SCHEDULE

Module	Topic	Periods
1	Atomic Structure II and Chemical bonding	11
2	Electrochemistry and Corrosion	12
3	Basic Organic Chemistry and Polymers	9
4	Fuels and Environmental Chemistry	9
	Theory	41
	Test	4
Total		**45**

COURSE OUTCOME

Student will be able to

- Enable the students to understand the latest concepts of atom model.
- Develop the basic theoretical concepts of orbitals and facts related to it. Develop the skill of writing electronics configuration of atoms.
- Introduce the concept of Chemical bonding and distinguish different types of chemical bond.
- Distinguish and justify different materials based on conductivity in Science and Technology
- Illustrate the mechanism of electrolysis with examples and to solve the problems related to electrolysis. Apply the concept of fuel cell in modern technology.
- Summarise the concept of corrosion and its after effects, solve the practical Problems related to it.
- Distinguish different types of refractories and glasses and apply this in industrial field.
- Compare, differentiate, explain, relate and extend the concept of polymers and polymerisation with examples.

- Understand, list and differentiate the concept of fuels, Identify and relate the impact of environmental pollution in daily life and to point out the remedial steps for it.

MODULE - I:

1.1.0   ATOMIC STRUCTURE – II AND CHEMICAL BONDING

1.1.1   Explain Bohr model of atom with merits and demerits

1.1.2   Explain dual nature of atom, deBroglie relation and Uncertainity Principle

1.1.3   Introduce the concept of orbit, orbital and quantum numbers with shapes of s
             and p – orbitals

1.1.4   Explain Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum
             multiplicity

1.1.5   Illustrate Electronic configuration of atoms of elements up to atomic number 20

1.1.6   Understand the idea of chemical bonding using octet rule

   1.1.7   Explain different types of chemical bonds – Ionic bond, Covalent bond,
              Coordinate

             bond and Hydrogen bonding with examples.

MODULE - II

2.1.0 : ELECTROCHEMISTRY AND CORROSION

2.1.1. Distinguish between
            a) Conductors and Insulators
            b) Metallic and electrolytic Conductors
            c) Strong and Weak Electrolytes

2.1.2   Illustrate electrolysis taking molten NaCl and aqueous NaCl solution as
            examples

2.1.3   Explain qualitative and quantitative statement of Faradays laws of electrolysis.

2.1.4   Explain the applications of electrolysis (electroplating and anodizing)

2.1.5   Outline schematic representation of galvanic cell

2.1.6   Explain the classification of galvanic cell as primary, secondary and fuel cells

2.1.7   Illustrate primary cell with Daniel Cell as example

2.1.8   Explain the concept of fuel cell taking H_2-O_2 fuel cell with advantages and
            applications

2.1.9   Introduce the concept of electrode potential and EMF of cell

2.1.10 Explain Electrochemical Series with applications

2.1.11 Define Corrosion

2.1.12 Explain rusting of Iron and mention the conditions of rusting

2.1.13 Explain electrochemical theory of corrosion

2.1.14 Describe the methods of prevention of corrosion (Barrier Protection, Sacrificial
            Protection, Cathodic Protection and Antirust Solutions.)

MODULE - III :

3.1.0 CHEMISTRY OF MATERIALS AND POLYMERS

3.1.1   Understand the fundamental ideas of Organic Chemistry

3.1.2   List the differences between Organic and Inorganic Compounds

3.1.3   Describe Uniqueness of Carbon atom

3.1.4   Distinguish between Saturated and Unsaturated Compounds and introduce Concept of functional group

3.1.5   Understand the retractories with the classification and properties

3.1.6   Explain general properties and types of glasses – soda glass, Borosilicate glass, safety glass and Insulating glass with their Contents and Uses

3.1.7   List the uses and advantages of optical fibres

3.1.8   Understand the term polymers, and polymerization

3.1.9   Explain the Various Classification of polymers

3.1.10 Distinguish between Natural and Synthetic rubber

3.1.11 Explain Vulcanisation and its merits

3.1..12 Introduce Common polymers- Poly ethene, polypropene, polystyrene, PVC, Neoprene, Teflon, Buna-s, Buna-N, Nylon-6 ,Nylon-66 and Bakelilte with their monomers and uses.

MODULE- IV

4.1.0: FUELS AND ENVIRONMENTAL CHEMISTRY

4.1.1   Understand the term fuel

4.1.2   Define Caloric Value

4.1.3   List the qualities of a good fuel

4.1.4   Explain the Classification into solid, liquid, gaseous and nuclearfuels with examples.

4.1.5   Explain preparation and properties of water gas and producer gas

4.1.6   Define cracking and distinguish between thermal and catalytic cracking

4.1.7   Introduce different regions of atmosphere

4.1.8   Recollect the terms Pollutant and Pollution

4.1.9   Understand different types of pollution – Air Pollution, Water Pollution and Soil Pollution

4.1.10   Understand the terms – ozone depletion, green house effect and acid rain

4.1.11   Explain different types of smog

4.1.12   Understand the relevance of Green Chemistry
(Principle and scope in the present scenario)

CONTENT DETAILS

MODULE - I :

Atomic Structure II and Chemical Bonding (11+1=12 hours)

Bohr Model of atom – Postulates, Merits and Demerits - Dual nature of matter – de Broglie relation – Uncertainty Principle – Concept of Orbit and Orbital – Quantum numbers – Sub energy levels (s,p,d,f) - shape of s and p orbitals.

Electronic Configuration of atom – Aufbau principle, Pauli's exclusion principle, Hund's rule of maximum multiplicity – electronic configuration of elements upto atomic number 20.

Chemical bonding – Octet rule – Electro negativity- Types of Chemical bonds - Ionic (Electrovalent) bond – Covalent bond, Coordinate bond and hydrogen bonding – Definition with two examples for each.

MODULE - II:

Electrochemistry and Corrosion (12+1=13 hours)

Classification of materials based on conduction – conductors, Semiconductors and Insulators – Definition with two examples each – Types of Conductors – Metallic and electrolytic conductors – Any four differences.

Electrolytes and Non - electrolytes – Definition with two examples – Strong and Weak Electrolytes – Definition with two examples -

Electrolysis – Definition – Electrolysis of molten NaCl and aqueous NaCl solution using Pt electrodes – Faraday's laws of electrolysis (Qualitative and Quantitative Statements only). Applications of electrolysis – Electroplating and Anodising – Any two differences – Electroplating of Nickel on mild steel – Anode, Cathode, electrolyte and half cell reactions – Electrochemical cell – Daniel cell – Representation of the cell – half cell and over all cell reactions – Primary and Secondary cells – definition and examples only – fuel cell – H_2-O_2 fuel cell – Cell reactions, advantages and applications – Electrode potential – standard electrode potential – EMF of cell – Electrochemical Series and its applications.

Corrosion – Definition and examples – rusting of iron Factors affecting rusting - conditions of rusting – Mechanism of rusting – Electrochemical theory – Types of Corrosion – Chemical and Electro chemical Corrosion – Prevention of Corrosion – Barrier Protection, Sacrificial Protection, Cathodic protection and Anti rust solutions.

MODULE - III:
Chemistry of Materials and Polymers (9+1=10 hours)
Introduction to organic chemistry – Differences between organic and inorganic compounds – Uniqueness of Carbon – Saturated and Unsaturated hydrocarbons –concept of functional group.

Refractories – Classification and properties – Glasses – General properties and types of glasses – Soda glass, Borosilicate glass, Safety glass and Insulating glass – Content and uses – Uses and advantages of Optical Fibres.

Polymers – definition – Classification of Polymers based on nature of monomers origin(source), structure, mode of synthesis and magnitude of intermolecular forces with two examples each – Natural rubber – Vulcanisation – Properties and merits – Common Polymers - monomers and uses – Polythene, Polypropene, Polystyrene, PVC, Neoprene, Teflon, Buna – S, Buna – N, Nylon-6, Nylon-66 and Bakelite.

MODULE - IV:

Fuels and Environmental Chemistry (9+1=10 hour)

Fuel - Definition – Calorific value – Qualities of a good fuel – classification of fuels – solid, Liquid, gaseous and nuclear fuels with three examples each – water gas and Producer gas – Preparation and Properties –Cracking – Thermal and Catalytic Cracking.

Environmental Chemistry - Regions of atmosphere – Pollutant and Pollution – Definition – Types of pollution – Air pollution, water pollution and Soil Pollution – Mention only major pollutants – Impact of Air Pollution – Ozone depletion, green house effect, acid rain and smog – Types of smog – Elementary ideas of green Chemistry.

REFERENCE :

Jain and Jain	Engineering Chemistry	Dhanpat Rai and Sons
S. S. Dara	Engineering Chemistry	S. Chand Publication
B. K Sharma	Industrial Chemistry	Geol Publication
S. S. Dara	Environmental Chemistry and Pollution Control	S. Chand Publication
	Wiley "All in One"	Wiley India Pvt. Ltd 2012 Editon.

COURSE TITLE : **BRANCH SPECIFIC THEORY**
COURSE CODE :
COURSE CATEGORY : **B**
PERIODS/WEEK : **4**
PERIODS/SEMESTER : **60**
CREDITS : **4**

COURSE TITLE   : **ENGINEERING GRAPHICS**
COURSE CODE   :
COURSE CATEGORY   : **F**
PERIODS/WEEK   : **4**
PERIODS/SEMESTER   : **60**
CREDITS   : **5**

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Orthographic Projection	15
2	Sectional views and auxiliary views	15
3	Pictorial drawing	15
4	Visualisation and Development of surfaces	15
	TOTAL	**60**

COURSE OUTCOME

After the completion of the course student will be able to
- o   Understand the orthographic projections of various objects
- o   Appreciate the sectional views of objects
- o   Appreciate the auxiliary views of objects
- o   Identify the pictorial drawings of various objects
- o   Understand the visualisation
- o   Understand the development of surfaces

SPECIFIC OUTCOME

MODULE - I

1.1.0 Understand the orthographic projections of various objects
    1.1.1 Apply principles of orthographic projection
    1.1.2 Explain the principle of orthographic projection with simple sketches
    1.1.3 Prepare an engineering drawing of a given simple engineering part in first
    angle   projection only.
    1.1.4 Sketch (free hand) the orthographic views of simple objects
    1.1.5 Draw the orthographic views of an object, given its pictorial drawing
    1.1.6 Select the minimum number of views needed to represent a given object fully
    1.1.7 Identify the engineering part correctly from a number of orthographic
    drawings

MODULE - II

2.1.0 Appreciate the sectional views of objects
    2.1.1 Recognize the need of sectional views
    2.1.2 Explain the need to draw sectional views
    2.1.3 Select the section place for a given component to reveal maximum information
    2.1.4 Free hand sectional views of simple objects
    2.1.5 Draw the sectional views of simple engineering components
    2.1.6 Sketch simple sections (Full and half) for a range of simple engineering objects
    2.1.7 Select the component from a given sectional view
    2.1.8 Auxiliary views

2.2.0 Recognize the need of auxiliary views
    2.2.1 State whether the auxiliary view is needed, given an engineering drawing
    2.2.2 Draw the auxiliary views of a given engineering drawing

MODULE - III

3.1.0 Identify the pictorial drawing of various objects
    3.1.1 Prepare pictorial drawing
    3.1.2 Explain the need for and types of commonly used pictorial drawing
    3.1.3 Prepare isometric drawing of simple objects using appropriate construction procedure, given their appropriate drawing
    3.1.4 Sketch the isometric views of simple engineering objects given either[1] orthographic drawing or actual components
    3.1.5 Prepare oblique drawing –Cavalier and cabinet –of simple engineering objects

        given either orthographic drawing or actual drawing
    3.1.6 Understand the visualisation
    3.1.7 Visualise and object in 3D, given its orthographic drawing
    3.1.8 Compare an engineering part with its drawing
    3.1.9 Identify surfaces with reference to orthographic drawing wing
    3.1.10 Prepare a model of the part, given its orthographic drawing

MODULE - IV

4.1.0 Understand the development of surfaces
    4.1.1 Prepare development of surfaces
    4.1.2 State the need for preparing the development drawing
    4.1.3 Prepare development of surfaces of simple engineering components like tray, funnel, bucket and ducts(rectangular and squarehooper)
    4.1.4 Prepare development of surfaces of surfaces of 90^0 elbow

4.2.0 Computer Aided Drafting

4.2.1 Introduction to CAD

4.2.3 Compare conventional drawing and CAD

4.2.4 Familiarisation of different CAD software

4.2.5 Application of CAD in engineering drawing

4.2.6 Opening of CAD

4.2.7 Setting of units and limits

4.2.8 Saving of drawing

4.2.9 Commands-draw commands- line, circle, arc, ellipse, polygon (2D primitives) hatch, modify, erase, move, rotate, copy, mirror, break ,trim, extent, scale, stretch, array fillet, chamfer, offset etc.

4.2.10 Dimensioning and text commands

4.2.11 Practice- Different methods of drawing lines

4.2.12 Absolute coordinate system

4.2.13 Relative coordinate system

4.2.14 Polar coordinate system

4.2.15 Direct distance entry

4.2.16 Rectangle, circle, ellipse,

4.2.17 Practice to draw orthographic views of simple objects and

4.2.18 familiarise with the above commands

CONTENT DETAILS

MODULE - I

1.1.0 Orthographic projection of objects

Explanation of the meaning of orthographic projection using a viewing box and a model- number views obtained need of only three views for displaying the object.

Concept front view - top view and side view-sketching these views for a number of engineering objects- explanation of the meaning of first angle and third angle projection – symbol of projection

MODULE - II
2.1.0 Sectional views of objects

Need for sectional drawing of an engineering object- selection of the section plane to reveal the maximum information – sectional views (full and half section) of simple engineering objects.

2.1.1 Auxiliary views

Need of auxiliary views – auxiliary views given engineering drawings

MODULE - III

3.1.0   Pictorial Drawing
 Isometric projections-construction of isometric scale-isometric projection of simple engineering object
 Oblique-cavalier-and cabinet projections of simple engineering Object

3.1.1   Visualization
 Preparation of pictorial view from a group of orthographic Drawing

MODULE - IV

4.1.0   Development of surfaces
 Development of surfaces of simple engineering components tray, funnel, bucket, duct (rectangular, square hooper) and 90^0 elbow

4.1.1 Computer Aided Drafting –
Introduction to CAD, Importance of CAD in engineering drawing- Applications

4.1.2 Opening CAD- setting and saving of drawing- CAD commands

4.1.3 Visualization Drawing with CAD- method of drawing straight line and simple figures.

TEXT BOOKS

    1. Engineering Graphics - K. C Jon, PHI Learning Private Limited

    2. Engineering Graphics - P. I. Varghese, VIP Publishers

REFERENCE BOOKS

    1. Engineering Drawing - N D Bhatt

    2. Engineering Graphics - Sageer & Abu

    3 Engineering Drawing - M. B. Shah and B.C.Rana, Pearson Publications

    4. Engineering Drawing & Graphics using Autocad – T.Jayapoovan,Vikas publications

COURSE TITLE : **WORKSHOP PRACTICE**
COURSE CODE :
COURSE CATEGORY : **F**
PERIODS/ WEEK : **3**
PERIODS/ SEMESTER(I & II): 90
CREDIT : **3**

<u>**TIME SCHEDULE**</u>

MODULE	TOPICS	PERIODS
1	Carpentry, Foundry & Casting	27
2	Smithy, Forging & Fitting	27
3	Sheet metal	18
4	welding	18
	TOTAL	90

Course outcomes:

        STUDENT WILL BE ABLE TO:

- **Perform various exercises on given drawing and specifications in Carpentry shop, Foundry & Casting shop.**
- **Perform various exercises on given drawing and specifications in Smithy, Forging & Fitting shop.**
- **Perform various exercises on given drawing and specifications in Sheet metal shop.**
- **Perform various exercise on given drawing and specifications in Welding shop.**

CONTENT DETAILS

MODULE I

Introduction, objectives, safety in the Carpentry shop, Foundry & Casting shop.
Familiarization of tools
<u>**Marking and measuring tools**</u> **such as straight edge- meter square- try square- bevel square- combination square- marking knife- marking gauge- mortise gauge- cutting gauge- wing compares- trammel- divider- outside and inside calipers- spirit level and plumb bob.**
<u>**Cutting tools**</u> **such as Rip saw- Cross cut saw- panel saw- tenon saw- bow saw- compass saw- key hole saw- firmer chisel- bevel edge firmer chisel- parting chisel- mortise chisel- jack plane- wooden and metal- trying plane- smoothening plane- rebate plane- plough plane- router plate- spoke shave.**
<u>**Boring tools**</u> **such as Bradawl ratchet brace- wheel brace- shell bit- fostries bit- counter sunk bit.**
<u>**Striking tools**</u> **such as mallet etc**
<u>**Holding devices**</u> **– Bench vice- bench stop- sash clamp- G-clamp- hard screw.**
<u>**Miscellaneous tools**</u> **– Rasp cut file- scraper- glass paper- pincers- ratchet and cabinet type screw drivers.**
Carpentry Practice
Marking- sawing- planning- chiseling- grooving- rebating exercises Preparation of carpentry joints.
Familiarization of Foundary tools

Hand tools – shovel- riddle- hammers- trowels- relic- lifters- strike off bar spruce- balloons- swab- gate cutter- mallet- vent rod- draw spike- lifting plate- pouring weight- gaggers- clamps, core & chaplets.

Moulding practice & casting

Preparation of moulding sand- Prepare moulds of different types using different patterns(single, double & three piece patterns)- ferrous & Non- ferrous metal casting using simple patterns.

MODULE II

Familiarization of Smithy tools

Hand tools – anvil- swage block- hammers such as ball peen- straight peen- cross peen and sledge hammers.Tongs such as flat- hallow- cold and hot chisels- swages- fullers- flatters- set hammers- pinch and drift.

Equipment: Open and closed hearth- heating furnaces- hand and power driven blowers- open and stock fire fuels such as charcoal- coal- oil and gas

Smithy & Forging Practice

Building fire in the furnace- Upsetting- bending- drawing- setting down- pinching- cutting and welding exercises

Familiarization of fitting tools

Hand tools & Marking tools – scriber- compass- dividers- outside and inside calliper- jenny calliper- ordinary scribing block- universal scribing block- angle plate- V-block- center punch- prick punch- try square- bevel square- surface plate- straight edge.

Cutting tools – chisels – flat- crosscut- half round- diamond point- side chisel. Files – single cut and double cut files rough- bastard- second cut- smooth Dead smooth files – flat- square- pillar- round triangular- half round- knife- safe edge and needle files.

Scribers – Neck saw – solid and adjustable frames – blades – cutting with point rack saw

Striking tools: ball peen- straight peen- cross peen and double-faced hammers

Holding devices-vice-bench- leg- pipe- hand- pin and tool makers vice

Marking tools – scriber – ordinary and universal scribing block- center and prick punch.

Angle plate- v-block- Try Square- surface plate

Fitting Practice

Cutting - filing- scribing and simple joints exercises

MODULE III

Familiarization of Sheet metal tools

Understand safety precautions.

Familiarization of sheet metal tools – scribers- dividers- trammel points- set square- punches – prick Punches- centre punches – hand Grover- rivet- set- chisels hammers- riveting hammers- ball peen hammers – mallet- snip- shears- pliers- hand reamers (tongs) files- stakes. Measuring instruments in sheet metal folding rule- common rule- steel circumference rule- vernier calipers- micrometer- calipers- thickness gauges (SWG) sheet metal gauge.

Practice work

Sheet cutting- development- folding- bending and pipe bending- making right angle joints.

MODULE IV

Familiarization of welding tools & safety

Safety precautions- Study of various tools and equipments used in the welding shop for both arc welding and gas welding.

Practice work
        1.D.C. arc welding
        2.A.C. arc welding
        3.Gas welding
        4. Edge preparation of welded joint such as V and double V.
        5.Horizontal -flat and vertical joints

General Information:

Examination in the Second Semester

TEXT BOOKS

3. **Mechanical Workshop Practice By K. C Jon, PHI Learning Private Limited**

4. **Mechanical Workshop & Laboratory Manual By K. C. John**

REFERENCE BOOKS

3. **S K Hajra Choudhary**   -   **Workshop Technology Vol. I**

4. **S K Hajra Choudhary**   -   **Workshop Technology Vol. II**

COURSE TITLE   : ENGINEERING SCIENCE LAB (For Semester I & II)
                                       [Engineering Physics & Engineering Chemistry Lab]
COURSE CODE   :
COURSE CATEGORY   : F
PERIODS PER WEEK   : 3
PERIODS /SEMESTER (I & II): 90
CREDITS   : 3

ENGINEERING PHYSICS LAB

TIME SCHEDULE

SL.No	Name of module	Course objective	Total period in 1 and 2 semester		
			Instructional	Test	Total
1	Measurement and calculation of different physical quantities	1:1 1:2 1:3	Practical: 42	3	45
Total periods 1 and 2 semester 45					

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

1. To measure volume of a cylinder using vernier calipers.
2. To measure volume of a wire using screw gauge.
3. To determine focal length of a convex lens by displacement method.
4. To determine the velocity of sound in air at room temperature using resonance column.
5. To determine spring constant using Hooke's law..
6. To determine acceleration due to gravity using simple pendulum.
7. To verify law of resistances.
8. To determine specific resistance of material using Meter Bridge.
9. To determine Internal Resistance of a Primary Cell using Potentiometer.
10. To plot characteristics of photoelectric cell (photoelectric current vs intensity of light and voltage applied)
11. To determine the mass of the given body using moment bar.
12. To determine the mass of a body by parallelogram method and by Lami's theorem.
13. To verify Ohm's law and to determine the resistance of the given wire.
14. To determine the coefficient of viscosity of a highly viscous liquid.
15. To determine the relative density using U- tube apparatus.

LIST OF PRACTICAL EXPERIMENTS – PHYSICS

1. Vernier calipers
2. Screw gauge
3. Convex lens
4. Resonance column
5. Hooke's law
6. Simple pendulum
7. Law of resistances
8. Meter bridge
9. Potentiometer
10. Photoelectric cell
11. Moment bar
12. Concurrent forces(mass of the body)
13. Ohm's law
14. Stoke's method for viscosity
15. U tube

ENGINEERING CHEMISTRY LAB

IME SCHEDULE

SL.No	Name of module	Course Objective	Total period in 1 and 2 semester		
			Instructional	Test	Total
1	Quantitative Analysis(Volumetric analysis)	1:1 1:2 1:3	Theory: Practical: 39	- 6	45
Total periods 1 and 2 semester 45					

On completion of the course the student will be able to:
Practical Volumetric Analysis

Single Titration
1. Standardisation of HCL
2. Standardisation of NaOH Double Titrations
3. Estimation of NaOH
4. Estimation of KOH
5. Estimation of Na2 CO3
6. Estimation of K2 CO3
7. Estimation of HCl

8.   Estimation of HNO3
9.   Estimation of H2 SO4
10.   Estimation of Oxalic acid
11.   Standardisation of KMnO4
12.   Estimation of Oxalic acid
13.   Estimation of Fe 2+ ion
14.   Estimation of Mohr's Salt
15.   Determination of PH of Solution
16.   Estimation of Zinc using EDTA
17.   Estimation of Magnesium Using EDTA

Reference:

Prof. A. O. THOMAS – PRACTICAL CHEMISTRY –Eight Edition 2000

COURSE TITLE : BRANCH SPECIFIC LAB

COURSE CODE :

COURSE CATEGORY : B

PERIODS/ WEEK : 3

PERIODS/ SEMESTER : 45

CREDIT : 2

COURSE TITLE   **: LIFE SKILL**
COURSE CODE   **:**
COURSE CATEGORY   **: C**
PERIODS/ WEEK   **: 2**
PERIODS/ SEMESTER   **: 30**
CREDIT   **: 2**

COURSE OUTCOME:-

Providing direction for the next generation and equipping them for successful living.

SPECIFIC OUTCOME:

- To make students aware of their thinking styles and to enable them to convert thinking into performance
- To make students learn and practice the steps involved in time management
- To give training for positive thinking which will keep the students in a good stead at the time of crisis.
- To translate performance of skills into efficient habits
- To make students understand the concept and components of personality, thereby to apply the acquired knowledge to themselves and to march towards excellence in their respective academic careers.
- To bring out creativity and other latent talents with proper goal setting so that self-esteem gets enhanced.
- To train students in order to ground concepts/ideas in their own experience
- To give inputs on some of the important interpersonal skills such as group decision-making, negotiation and leadership skills.
  Introduce the basic concepts of body language for conflict management.
- To enable students to convert the conceptual understanding of communication into everyday practice.
- To help students understand the mechanism of stress particularly negative emotions such as anxiety, anger and depression for effective management.

TIME SCHEDULE

MODULE	TOPIC	PERIODS
I	Self Awareness and Empathy Logical Thinking and Creative Thinking	8
II	Decision Making And Problem Solving	6
III	Effective Communication	8
IV	Inter Personal Relations Coping with Stress and Emotion	8
TOTAL		**30**

MODULE - I - **Self Awareness and Empathy**
Logical Thinking and Creative Thinking

Self Concept – SWOT Analysis – Self Growth – Goal Setting – Time Management - Personal Well Being – Empathy – Understanding –Empathy Acknowledgement – Psychological Hug – Empathetic Language –

Thinking – Process, types and components – Learning – creativity – Creative Problem Solving Right and left Brain thinking – Generative thinking techniques – Synthesis – Thinking outside the box – Lateral thinking – Risk taking

MODULE - II **Decision Making and Problem Solving**

Factors influencing Decision making – Values and Ethics – Emotional and physical considerations – Role conflict – Decision Making methods – Problem Solving – Process – Steps – Establishing frameworks, Analysing, evaluating options, and implementing solutions – Problem solving techniques

MODULE - III **Effective Communication**

Importance – Benefits – Levels/Dimensions - Barriers – Types – LRSW – Oral Communication – Non verbal communication, Body Language – Written Communication

MODULE - IV **Interpersonal Relationship -**
Coping with Stress and Coping with Emotion

Nature - Factors influencing IPR – Trust – Strategies – Johari Window – Transactional Analysis – Team work – Assertive communication

Stress – Nature, types – Personality and stress – Managing stress – Relaxation techniques – Improving attitudes – Emotions - Emotional competence – Components – Promoting EI – Anger Management

Text Books:

1. Barun K Mitra (Oxford) - Personality Development and Soft Skills

2. Gopalaswamy Ramesh & Mahadevan Ramesh (Pearson) - The ACE of Soft Skills
Attitude, Communication and Etiquette for Success