REGULATIONS

for the

B. Tech. Degree Programmes (except Marine Engineering) offered under Faculty of Engineering

(With effect from 2019 Admissions)

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
COCHIN – 682 022

REGULATIONS FOR B. Tech. DEGREE PROGRAMMES UNDER FACULTY OF ENGINEERING

The following regulations are made applicable to all the B Tech. programmes offered by the University under Faculty of Engineering except Marine Engineering with effect from the academic year 2019-20.

1. B Tech. Programme

The duration of the B Tech. programme shall be eight semesters spanning over four academic years. Each semester shall consist of 15 weeks.

1.1 Branch

a) Civil Engineering
b) Computer Science and Engineering
c) Electrical and Electronics Engineering
d) Electronics and Communication Engineering
e) Information Technology
f) Mechanical Engineering
g) Safety and Fire Engineering

1.2 Structure of the B Tech. Programme

1.2.1 The programme of instruction will consist of the following:

a) General (common) core courses comprising basic sciences, mathematics, and basic engineering;
b) Engineering core courses introducing the student to the foundations of engineering in the respective branch;
c) Elective courses enabling the student to opt and undergo a set of courses of interest to him/her;
d) Professional practice including project, seminar, and industrial training; and
e) Humanities courses on soft skills.

1.2.2. Every branch of the B Tech. programme will have a curriculum and syllabus for the courses approved by the Academic Council.

1.2.3. The B Tech. programmes offered by the University Departments/Schools/Cochin University College of Engineering, Kuttanad shall follow the credit system.

1.2.4. The curriculum of any branch of the B Tech. programme shall have a total of 160 credits as minimum.

1.3 Course Registration

It is mandatory for the students to register for the courses in each semester.

Before registration, the students should

a) Clear all dues including any fees to be paid and should not have any disciplinary issues pending.
b) Meet the requirements regarding the minimum number of credits for promotion stipulated in clause 1.10.

The dates for registration will be announced by the School/College in their academic calendar. Late registration will be allowed up to 7 working days from the commencement of the semester with late registration fee.

1.4 Mode of Evaluation

1.4.1. The performance of the students in theory courses will be evaluated based on continuous assessment and semester end examination. In the case of laboratory courses, the evaluation will be based on continuous assessment and semester end assessment which will be carried out internally.

1.4.2. For theory courses, there will be 40% weightage for internal assessment and 60% weightage for semester end examination. For practical courses, continuous assessment and semester end assessment will carry 50% weightage each.

1.4.3. For theory courses, the assessment pattern will be as follows:

Continuous Assessment:

a) First Periodical Test   - Maximum marks: 12.5
b) Second Periodical Test   - Maximum marks: 12.5
c) Assignments   - Maximum marks: 10
d) Attendance   - Maximum marks: 5

Semester End Examination

a) Exam shall be shall be of 3 hours duration.
b) Maximum marks: 60

1.4.4. For laboratory courses, the assessment pattern will be as follows:

Continuous Assessment:

The marks may be awarded on the basis of the performance of the student in the laboratory sessions. The break-up of marks for continuous assessment of laboratory courses shall be:

    a) Practical records/Outputs   - Maximum marks: 10
    b) Lab work   - Maximum marks: 10
    c) Attendance   - Maximum marks: 5

Semester End Assessment:

The semester end assessment will consist of an examination and a viva voce.
Maximum marks for semester end examination: **25**

1.4.5. At the end of the semester, semester examination will be conducted in all the theory courses offered in the semester and they will be of three hours duration unless otherwise specified. The Controller of Examinations will make necessary arrangements for setting the question papers and valuation of answer books for the semester end examination of theory courses.

1.4.6. The semester end assessment for the laboratory courses shall be conducted internally by the respective department / division with at least two faculty members as examiners. One of the examiners for conducting the semester end laboratory examination shall be at the level of Associate Professor or above in the regular cadre.

1.4.7. In the case of project work, the project guide concerned shall make the continuous assessment. A committee consisting of the Project Coordinator (nominated by the Head of the Department / Division), project guide, and at least one senior faculty member at the level of Associate Professor or above will carry out the final review.

The weightages for the assessment of project work shall be as follows:

Continuous assessment   : 40 percent
Project Report   : 20 percent
Final review   : 40 percent

1.4.8. The Viva-voce examination at the end of VIII semester will be conducted by a panel of three examiners consisting of the Head of the Department/Division or his/her nominee and one senior faculty at the level of Associate Professor or above of the Department/Division and preferably, one external expert.

1.4.9. A candidate shall not be allowed to improve the continuous assessment marks in theory/laboratory courses. A candidate who desires to improve his/her marks in the semester end examination in theory courses shall be permitted to do so in the next available chance. This facility will be available only once for a theory course.

1.5 Course Completion and Earning of Credits.

Students registered for a course have to attend the course regularly and meet the attendance rules of the University and appear for all the internal evaluation procedures for the completion of the course. However, credits can be earned only on completion of the semester end examination and on getting a pass grade. Students, who have completed a course, but could not write the semester end examination for valid reasons, are permitted to write the examination at the next available chance and earn the credits without undergoing the course again.

1.6 Eligibility to Appear for the Semester End Examination

1.6.1 A candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for the completion of a semester.

A student shall secure not less than 75% of overall attendance in a semester taking into account the total number of periods in all courses attended by the candidate as against the total number of periods in all courses offered during that particular semester.

1.6.2 The Principal/Head of the School/College shall have the power to condone shortage of attendance up to 5% (between less than 75% and 70%) in a particular semester due to medical reasons (hospitalization/accident/specific illness) duly verified and recommended by the Head of the Division/Department and on production of medical certificate from a registered medical practitioner endorsed by the University Medical Officer and on payment of the required fee. However, such condonation for shortage of attendance shall be given only twice during the entire duration of the B Tech. programme.

1.6.3 The Vice Chancellor shall have the power to condone shortage of attendance up to additional 5% (between less than 70% and 65%) in a particular semester due to medical reasons (hospitalization/accident/specific illness) duly verified and recommended by the Principal/Head of the School/College and on production of Medical certificate from a registered medical practitioner endorsed by the University Medical Officer and on payment of the required fee. However, such condonation for shortage of attendance shall be given only twice during the entire duration of the B Tech. programme.

1.6.4 Candidates who secure overall attendance of less than 65% (subject to clauses 1.6.2 and 1.6.3 above) will not be permitted to write the semester end examinations and will not be permitted to go to next/subsequent semester. They are required to repeat the incomplete semester in the next academic year.

1.7 Eligibility to Write the Supplementary Examination

Failed candidates and those who could not write the semester end examination due to health reasons or other contingencies that are approved by the Head of the School/College can register for the supplementary examination. Those who wish to improve their performance in the semester end examinations can also register for the same, subject to the provisions of clause 1.4.9. Grades awarded in the supplementary examination will be taken as semester grades in these subjects and will be based on the semester examination grading pattern in that subject. In the case of candidates appearing for improvement of marks, the higher mark obtained will be considered for the purpose of grading.

A candidate who fails to obtain a pass in courses having only continuous assessment will be permitted to repeat the course along with the junior batches.

1.8. Revaluation

A candidate can apply for revaluation of his/her semester end examination answer paper in a theory course, within 2 weeks from the declaration of results, on payment of a prescribed fee along with prescribed application to the Controller of Examinations through the Head of Department/School/College. The Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department/School/College. Revaluation is not permitted for laboratory courses, courses having only continuous assessment, seminar and project work.

1.9. Pass Requirements

A candidate has to obtain a minimum of 50% marks for continuous assessment and semester end examination put together with a minimum of 40% marks in the semester end examination for a pass in theory and laboratory courses.
In the case of theory/laboratory courses having only continuous assessment, a candidate has to obtain a minimum of 50% marks in continuous assessment for a pass.

1.10 Promotion to Higher Semesters

A student will be given at least one regular chance and one supplementary chance for the semester end examination of a particular semester in both theory and practical courses to obtain a pass grade before he/she is assessed for promotion to higher semesters.

Promotion to III, V and VII semesters shall be subject to the following conditions:

Promotion to	Minimum number of credits to be earned
III Semester	10 out of 20 credits of Semester I
V Semester	30 out of 60 credits of Semesters I, II, &III

VII Semester	50 out of 100 credits of Semesters I to V

1.11 Grading

1.11.1. Grades shall be awarded to the students in each course based on the total marks obtained in continuous assessment and at the end semester examination and as per the provisions of clause 1.4.1.

The grading pattern shall be as follows:

Marks obtained (Percentage)	Grade	Grade points
90 to 100	S	10
80 - 90	A	9
70 - 80	B	8
60 - 70	C	7
50 - 60	D	6
< 50	F	0

Note: Where X – Y range denotes 'X' inclusive and 'Y' exclusive

1.11.2. A student is considered to have credited a course or earned credits in respect of a course if he/she secures a grade other than F for that course.

1.11.3. Grade Point Average.

 The academic performance of a student in a semester is indicated by the Grade Point Average (GPA).

$$GPA = \frac{G_1C_1 + G_2C_2 + G_3C_3 + \text{----------}G_nC_n}{C_1 + C_2 + C_3 + \text{-----------------}C_n}$$

Where 'G' refers to the grade point and 'C' refers to the credit value of the corresponding course undergone by the student.

The Grade Point Average (GPA) for each semester will be calculated only for those students who have passed all the registered courses of that semester. Similarly, Cumulative Grade Point Average (CGPA) up to any semester will be calculated only for those students who have passed all the courses up to that semester.

1.11.4. Grade Card

The Grade Card issued at the end of the semester to each student by the Controller of Examinations, will contain the following:

a) The code, title, number of credits of each course registered in the semester,
b) The letter grade obtained,
c) The total number of credits earned by the student upto the end of that semester and
d) GPA & CGPA.

1.11.5. Classification

On successful completion of the programme, CGPA will be calculated as follows:

$$CGPA = \frac{C_1\,GP_1 + C_2 GP_2 + C_3\,GP_3 + \text{----------}CnGP_n}{C_1 + C_2 + C_3 + \text{------------------}C_n}$$

Where 'GP' refers to the grade point average (GPA) and 'C' refers to the total number of credits obtained by a student in a particular semester.

The classification based on CGPA is as follows:

CGPA 8 and above : First Class with distinction
CGPA 6.5 and above, but less than 8 : First Class
CGPA 6 and above, but less than 6.5 : Second Class.

1.11.6. Conversion of GPA/CGPA to Percentage marks

The following formula shall be used to convert the SGPA/CGPA obtained by a student to percentage marks.

Percentage marks = (GPA/CGPA – 0.5) 10

1.12 Electives

The curriculum for each programme consists of four Professional Electives and two Open Electives. The students shall select one Open Elective from among the courses offered in that particular semester by a Division/Department other than his/her Division/Department.

1.13 Faculty Advisor

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a teacher of the Department who shall function as Faculty Advisor for these students throughout their period of study. Such Faculty Advisor shall advise the students and monitor the courses taken by the students, check the attendance and progress of the students attached to him/her and counsel them periodically. If necessary, the Faculty Advisor may also discuss with or inform the parents about the progress/performance of the students concerned.

1.14 Class Committee

A class committee consists of teachers of the class concerned, student representatives and a chairperson who does not handle any subject for the class. It is like the 'Quality Circle' (more commonly used in industries), with the overall goal of improving the teaching-learning process. The functions of the class committee include:

a. Solving problems experienced by students in the classroom and in the laboratories in consultation with Head of the Division/Principal/Director.
b. Clarifying the regulations of the degree programme and the details of rules therein.
c. Informing the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for each assessment.
d. Informing the student representatives, the details of regulations regarding weightage used for each assessment.
e. Discussing in the class committee meeting the breakup of marks for each experiment/exercise/module of work, in case of practical course (laboratory/ drawing/project work/seminar etc.) and informing the students.
f. Analysing the performance of the students of the class after each test and finding ways and means of improving the performance of the students.
g. Identifying the students who are low achievers or weak in their subjects if any, and requesting the teachers concerned to provide some additional help or guidance or coaching to such students.

The class committee is normally constituted by the Head of the Division. However, if the students of different branches are mixed in each class the class committee is to be constituted by the Principal/Director. The class committee shall be constituted within a week from the date of commencement of a semester. At least 4 student representatives from the respective class (usually 2 boys and 2 girls) shall be included in the class committee. The student representatives shall be nominated on the basis of their academic performance since the first semester of the B Tech. programme. In the case of first and second semesters, the rank obtained in the Common Admission Test (CAT) shall be the criterion for nominating the student representatives. The Chairperson of the class committee may invite the Faculty Advisor(s) and the Head of the Division to the meeting of the class committee. The Chairperson of the class committee is required to prepare the minutes of every meeting, submit the same to the Head of the Division within two days of the meeting and arrange to circulate the same among students concerned and teachers. If there are some points in the minutes requiring action by the University, the same shall be brought to the attention of the Principal/Director and the Registrar.

The first meeting of the class committee shall be held within fifteen days from the date of commencement of the semester. The nature and weightage of internal assessments shall be decided in the first meeting, within the framework of the regulations and the same shall be communicated to the students. Two or three subsequent meetings in a semester may be held at suitable intervals. During these meetings the student members

representing the entire class, shall meaningfully interact and express their opinions and suggestions of the class to improve the effectiveness of the teaching-learning process.

1.15. Course Committee for Common Courses

Each common theory course offered to more than one discipline or group of disciplines shall have a "Common Course Committee" comprising all the teachers teaching the common course with one of them nominated as Common Course Coordinator. The nomination of the Course Coordinator shall be made by the Principal/Director in consultation with Heads of Divisions from among the teachers teaching the common courses. The "Common Course Committee" shall meet as often as possible and ensure uniform evaluation of internal assessments after arriving at a common scheme of evaluation for the tests. Wherever feasible, the common course committee shall prepare a common questionpaper for the test(s).

1.16 Discipline

Every student is required to observe discipline and decorous behavior both inside and outside the campus and refrain from any activity which may tarnish the image of the University as per the provisions of the Cochin University Students' (Conduct and Disciplinary) Code - 2005. Any act of indiscipline, misbehavior including unfair practice in examinations will be referred to the authorities of the University that will make a detailed enquiry on the matter and decide on the course of action to be taken.

1.17 Amendment to Regulations
 Notwithstanding all that has been stated above, the University has the right to modify any of the above regulations from time to time.

B.TECH DEGREE PROGRAMME

Scheme of Examinations for Semesters I and II (2019 admission onwards)

SEMESTER I [Stream A]

Code No.	Subject	L Hrs/ Wk	T Hrs/ Wk	P/D Hrs/ Wk	C	Marks CA	SEE	Total
19-200-0101A	Computer Programming	3	1	0	3	40	60	100
19-200-0102A	Engineering Chemistry	3	1	0	3	40	60	100
19-200-0103A	Engineering Graphics	2	1	3	3	40	60	100
19-200-0104A	Basic Electrical Engineering	3	0	0	3	40	60	100
19-200-0105A	Basic Electronics Engineering	3	0	0	3	40	60	100
19-200-0106A	Environmental Studies	3	1	0	3	40	60	100
19-200-0107A	Electrical Engineering Workshop	0	0	3	1	25	25	50
19-200-0108A	Computer Programming Laboratory	0	0	3	1	25	25	50
	TOTAL	**17**	**4**	**9**	**20**			

CA – Continuous Assessment, SEE – Semester End Examination

Stream A: Civil Engineering, Electrical and Electronics Engineering, Mechanical Engineering and Safety and Fire Engineering.

SEMESTER II [Stream A]

Code No.	Subject	L Hrs/ Wk	T Hrs/ Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	SEE	
19-200-0201A	Calculus	3	1	0	3	40	60	100
19-200-0202A	Engineering Physics	3	1	0	3	40	60	100
19-200-0203A	Engineering Mechanics	4	1	0	3	40	60	100
19-200-0204A	Basic Civil Engineering	3	0	0	3	40	60	100
19-200-0205A	Basic Mechanical Engineering	3	0	0	3	40	60	100
19-200-0206A	Soft Skills Development	2	1	0	2	50	-	50
19-200-0207A	Civil Engineering Workshop	0	0	3	1	25	25	50
19-200-0208A	Mechanical Engineering Workshop	0	0	3	1	25	25	50
19-200-0209A	Language Lab	0	0	1	1	25	25	50
19-200-0210A	NSS/Nature conservation Activities	0	0	1	0	-	-	-
	TOTAL	**18**	**4**	**8**	**20**			

SEMESTER I [Stream B]

Code No.	Subject	L Hrs/ Wk	T Hrs/ Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	SEE	
19-200-0101B	Calculus	3	1	0	3	40	60	100
19-200-0102B	Engineering Physics	3	1	0	3	40	60	100
19-200-0103B	Engineering Mechanics	4	1	0	3	40	60	100
19-200-0104B	Basic Civil Engineering	3	0	0	3	40	60	100
19-200-0105B	Basic Mechanical Engineering	3	0	0	3	40	60	100
19-200-0106B	Soft Skills Development	2	1	0	2	50	-	50
19-200-0107B	Civil Engineering Workshop	0	0	3	1	25	25	50
19-200-0108B	Mechanical Engineering Workshop	0	0	3	1	25	25	50
19-200-0109B	Language Lab	0	0	1	1	25	25	50
19-200-0110B	NSS/Nature conservation Activities	0	0	1	0	-	-	-
	TOTAL	**18**	**4**	**8**	**20**			

CA – Continuous Assessment, SEE – Semester End Examination

Stream B: Computer Science and Engineering, Electronics and Communication Engineering and Information Technology

SEMESTER II (STREAM B)

Code No.	Subject	L Hrs/ Wk	T Hrs/ Wk	P/D Hrs/ Wk	C	Marks		Total
						CA	SEE	
19-200-0201B	Computer Programming	3	1	0	3	40	60	100
19-200-0202B	Engineering Chemistry	3	1	0	3	40	60	100
19-200-0203B	Engineering Graphics	2	1	3	3	40	60	100
19-200-0204B	Basic Electrical Engineering	3	0	0	3	40	60	100
19-200-0205B	Basic Electronics Engineering	3	0	0	3	40	60	100
19-200-0206B	Environmental Studies	3	1	0	3	40	60	100
19-200-0207B	Electrical Engineering Workshop	0	0	3	1	25	25	50
19-200-0208B	Computer Programming Laboratory	0	0	3	1	25	25	50
	TOTAL	**17**	**4**	**9**	**20**			

Evaluation Pattern for Theory and Practical courses

1. Theory courses

Type of Questions for Semester End Examination (SEE)

PART - A (8 x 4 = 32 marks)

Question No. I (a) to (h) – Eight short answer questions of 4 marks each with twoquestions from each of the four modules.

PART - B (4 x 10 = 40 marks)

Question nos. II, III with sub sections (a), (b) ---- 10 marks each with option toanswer either II or III from Module I.

Question nos. IV, V with sub sections (a), (b) ---- 10 marks each with option toanswer either IV or V from Module II.

Question nos. VI, VII with sub sections (a), (b) ---- 10 marks each with option toanswer either VI or VII from Module III.

Question nos. VIII, IX with sub sections (a), (b) ---- 10 marks each with option toanswer either VIII or IX from Module IV.

The maximum marks that can be awarded for the Semester End Examination (SEE) will be only 60, even though the questions are for 72 marks.

2. Practical courses

50% marks is earmarked for Continuous Evaluation, and 50% marks for Semester End Examination. The Semester End Examination to be conducted by a minimum of two examiners – one, not below the rank of an Associate Professor. A candidate shall secure a minimum of 50% marks in the aggregate and 40% minimum in the Semester End Examination for a pass.

In the case of courses having only continuous assessment, a minimum of 50% marks in the assessment is required for a pass.

19-200-0101B/ 12-200-0201A CALCULUS

Course Outcomes:
On completion of this course the student will be able to:
1. Recall the methods of differentiation and integration.
2. Solve ordinary differential equations and linear differential equations of higher orders with constant coefficient and apply them in engineering problems
3. Estimate the maxima and minima of multi variable functions.
4. Evaluate area as double integrals and volume as triple integrals in engineering applications.
5. Illustrate the application and physical meaning of gradient, divergence and curl.

Module I
Ordinary differential equations:
First order differential equations - exact differential equations, Bernoulli's equations-- Methods of solution and Simple applications.
Linear differential equations of higher orders with constant co-efficient-Methods of solution of these equations. Cauchy's linear differential equations. Simultaneous linear differential equations- Simple applications of linear differential equations in engineering problems – Electrical Circuits, Mechanical Systems.

Module II
Partial differentiation: Partial differentiation-Concept of partial derivative   - Chain rule- Total derivative- Euler's theorem for homogeneous functions, Differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables(Proof of the result not required)-Simple applications.
Co-ordinate systems: Rectangular co-ordinates-Polar co-ordinates-In plane and in Space- Cylindrical polar co-ordinates-Spherical polar co-ordinates.

Module III
Integral calculus:
Application of definite integrals: Area, Volume, Arc length, Surface area.
Multiple integral: Evaluation of double integrals-Change of order of integration. Evaluation of triple integrals-Change of Variables in integrals.
Applications of multiple integrals. Plane Area, Surface area &Volumes of solids

Module IV
Vector calculus: scalar and vector point functions, gradient and directional derivative of a scalr point function, divergence and curl of vector point functions, their physical meaning. Evaluation of line integral, surface integral, and volume integrals, Gauss's divergence theorem, Stoke's theorem (No proofs), conservative force fields, scalar potential.
References:
1. Sastry, S.S. Engineering mathematics: Vol1. (Fourth edition).PHI Learning, New Delhi. (2008).
2. Erwin Kreyzig. Advanced engineering mathematics (Tenth edition). John Wiley& Sons, Hoboken, NJ.(2011)
3. Veerarajan, T. Engineering mathematics.(third edition). Tata McGraw Hill Publishers, New delhi. (2011)
4. Grewal, B.S. Higher engineering mathematics. (Forty third Edition). Khanna Publishers, New Delhi. (2013).

19-200-0102B/ 19-200-0202A ENGINEERING PHYSICS

Course Outcomes:

On completion of this course the student will be able to:
1. Interpret modern devices and technologies based on lasers and optical fibres.
2. Explain the basic principles of crystal physics and applications of liquid crystals.
3. Summarise the characteristics and applications of nano materials and superconducting materials
4. Explain the factors affecting the acoustics of buildings and application of ultrasonics in non-destructive testing.

Module I

Laser-introduction—properties-interaction of radiation with matter-absorption-spontaneous and stimulated emission-principle of laser--Einstein coefficients-conditions for getting laser- population inversion- metastable state -Basic components of a laser-Different types of lasers- construction, working and applications of Ruby laser-Neodymium YAG laser- He-Ne laser -Applications of laser in medicine, industry, science and communication.

Holography-basic principle-Comparison with ordinary photography-Recording and reconstruction of holograms -applications.

Fibre optics - Basic structure of an optical fibre - propagation of light in an optical fibre- classifications-step-index fibre and graded index fibre- single mode and multimode- Numerical aperture of a step-index fibre, graded index fibre---acceptance angle and acceptance cone-modes of propagation - Applications.

Module II

Crystallography – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems-Bravais lattices-Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Co-ordination number- Atomic radius-Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc-Bragg's law- Bragg's x-ray spectrometer.

Liquid crystals- Liquid crystals, display systems-merits and demerits- Metallic glasses-Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical, magnetic and chemical properties). Shape memory alloys- Shape memory effect.

Module III

Introduction to nanoscale science and technology- nanostructures-classifications-nanoring, nanorod,nanoparticle,nanoshells,fullerence- surface occupancy-quantum confinement effect- Properties of nanoparticles- optical, electrical, magnetic and mechanical properties-Applications of nanotechnology.

Superconductivity-Introduction--transition temperature-Meissner effect-effect of current-entropy-specific heat-isotope effect-penetration depth-.Types of superconductors-type 1 and type 2- cooper pair-BCS theory (briefly)-AC Josephsons effect- DC Jospehsons effect- Applications of super conductivity.

Module IV

Quantum mechanics-Introduction- quantum theory-black body radiation and Photoelectric effect (brief ideas only)-matter waves- de broglie wavelength-wave packet-uncertainty principle-wave function -Physical intrepretation -Time dependent Schrodinger equation for a free particle- Time independent schrodinger equation.

Ultrasonics-production of ultrasonics -piezo electric effect-Magnetostriction effect-properties of ultrasonics- Application of ultrasonics in non-destructive testing - Acoustics of building-reverberation- Absorption Coefficient- Sabines formula for reverberation time (no derivation)-Accoustic intensity- loudness-decibel-phon-conditions for good acoustics(Qualitative study).

References:

1. S. Mani Naidu, A Text book of Engineering Physics, Pearson. (2010)

2. A.S. Vasudeva, Modern Engineering Physics, S. Chand & Co. (2013)

3. Prabir K. Vasu and Hrishikesh Dhasmana, Engineering Physics, Ane books Pvt. Ltd. (2010)

4. S.O. Pillai and Sivakami, Applied Physics, New Age International (P) Ltd., Second Edition. (2008)

5. G.S. Raghuvanshi, Engineering Physics, Prentice Hall of India.(2008)

19-200-0103B/ 19-200-0203A ENGINEERING MECHANICS

Course Outcomes: On completion of this course, a student will be able to

1. Understand the principles of mechanics (statics and dynamics), the concept of free body diagrams and resolution of forces.
2. Apply the principles of mechanics, concept of free body diagrams and resolution of forces and equations of equilibrium or motion to given engineering or physical applications.
3. Analyse given engineering or physical applications and calculate the required parameters like forces, moments, various motion parameters like, displacement, velocity, acceleration, etc.
4. Ascertain the physical and mathematical meaning of quantities, like centroid, moment of inertia and their applications in engineering and locate centroid and calculate the moment of inertia or second moment of area of typical sections used in engineering.

Module I
Introduction to Mechanics: Definition and classification of mechanics – rigid body (statics and dynamics) and deformable body mechanics.
Forces and Force systems: Force and its characteristics, Principles of statics – concept of resultant and equilibrant, Composition and resolution of forces, force systems.
Coplanar Concurrent force system: Equilibrium of two, three and more than three forces, Moment of a force, Varignon's theorem of moments, Equations of equilibrium, Friction and its effects on bodies, Engineering applications.
Coplanar Parallel force System: Two parallel forces, General case of parallel forces in a plane, Centre of parallel forces, Centre of gravity, Centre of mass, Centroids of curves, areas and volumes – regular and composite, Pappus's theorems, Equilibrium of distributed forces in a plane, Applications of the concept of centroid in engineering practice.

Module II
Moment of Inertia: Concept of moment of inertia and second moment of area, Moment of inertia of regular and composite solids, Second moment of area of regular and irregular surfaces, Polar moment of inertia / second moment of area, Product of inertia, Principal moments of inertia and principal axes, Applications of the concepts in engineering practice.
Coplanar non-concurrent force system and Analysis of Plane trusses and frames: Resultant of a general case of force system in a plane, Equilibrium equations, Concept of load carrying mechanism in trusses and frames – internal (axial) forces, two force and multi force members, Analysis of plane trusses by Method of joints and Method of sections, Analysis of Plane frames by Method of members.

Module III
Principle of virtual work: Concept of virtual work and the principle of virtual work, Applications in engineering, Equilibrium of ideal systems, Stable and unstable equilibrium.
Introduction to Dynamics: Definitions, Units, Divisions – Kinematics, Kinetics.
Rectilinear translation: Kinematics of rectilinear motion – displacement, velocity, acceleration, Kinetics – Differential equations of motion, D'Alembert's principle in rectilinear translation and its applications, Motion of a particle due to a constant force, Motion of a particle due to a force proportional to displacement – Simple harmonic motion, Momentum

and impulse, Work and energy, Conservation of energy, Collision of two bodies – direct central impact.

Module IV

Curvilinear translation: Kinematics of curvilinear translation – components of displacement, velocity and acceleration, normal and tangential acceleration, Kinetics – Differential equations of motion, Motion of a projectile – projection on horizontal and inclined surfaces, D'Alembert's principle in curvilinear motion and its applications, Moment of momentum, Work and energy in curvilinear motion.

Rotation of a rigid body: Kinematics of rotation – angular displacement, velocity and acceleration, RPM, Relations of kinematic parameters of linear and angular motions, Kinetics – Differential equations of motion of a rigid body rotating about a fixed axis, Rotation under the action of a constant moment, Rotation proportional to angular displacement – Compound pendulum, D'Alemberts principle in rotation, Resultant inertia force in rotation, Principle of angular momentum in rotation, Energy equation for rotating bodies.

References

1. Timoshenko and Young. Engineering mechanics. McGraw Hill Book Company, Singapore. (1956)
2. Beer, F. P. and Johnston, E. R. Mechanics for engineers (Vol. 1: Statics and Vol.2: Dynamics). Tata McGraw Hill, New Delhi.(2004).
3. Merriam, H. L. and Kraige, L. G. (2003). Engineering mechanics (Vol. 1: Statics and Vol.2: Dynamics*)*. John Wiley and Sons, Somerset, N.J.(2003)
4. Hibbeller, R.C. Engineering mechanics. Vol. 1: Statics, Vol. 2: Dynamics. (Twelfth edition). Pearson Education Asia Pvt. Ltd., New Delhi.
5. Rajasekaran,S. and Sankarasubramanian,.G. Fundamentals of engineering mechanics. (Third edition). Vikas Publishing House Pvt. Ltd., New Delhi.(2010)

19-200-0104B/19-200-0204A BASIC CIVIL ENGINEERING

Course outcomes
At the end of the course students will be able to
1. Summarize the types, uses and properties of various building materials
2. Explain the different components of building and types of foundations
3. Illustrate the fundamental aspects of civil engineering
4. Discuss about the surveying techniques and to solve problems related with levelling
5. Recognize the various modern services emerging in the field of civil engineering
6. Prepare site plan based up on the Kerala Municipality Building Rule

Module I
Engineering Materials: Cement - varieties and grade of cement and their uses. Cement mortar- Steel- types of steel for reinforcement bars, steel structural sections. Brick- varieties and strength, tests on bricks.
Aggregates- types & requirements. Concrete- grades of concrete as per IS code, water cement ratio, workability, mixing, batching, placing, compaction and curing.

Module II
Construction : Components of a building-Foundation- types of foundations- isolated footing, combined footing, raft, pile & well foundations- Foundation for Machinery
Super structure: Brick masonry, English bond and Flemish bond, Stone masonry-Ashlar masonry- Rubble masonry. Roofing- Steel trusses, roofing for industrial buildings

Module III
Surveying: Basic Principles of surveying, instruments, methods and measurements- linear measurements- reconnaissance, selection of survey stations.
Leveling: Leveling instruments, different types, temporary adjustments, reduced level of point, booking of field notes, and reduction of levels by height of collimation method. Introduction to Total Station.

Module IV
Site planning and Building Rules-Selection of site-Site plan preparation for buildings-Kerala Municipal Building Rules prevailing, general provisions regarding site and building requirements-Coverage and Floor Area Ratio-Basic concepts of Intelligent Buildings and Green Buildings
Roads- Classification of Rural and urban Roads.
Sources of Water - Water Supply-Quality of Water.

References:
1. Chudley, R., Construction Technology, Vol. I to IV, Longman Group, England (2011).
2. Chudley, R. and Greeno, R., Building Construction Handbook, Addison Wesley, Longman Group, England (1998)
3. Mamlouk, M. S., and Zaniewski, J. P., Materials for Civil and Construction Engineering, Pearson Publishers (2011)
4.McKay, W. B. and McKay, J. K., Building Construction, Vol. 1 to 4, Pearson India Education Services.(2013)
5. Rangwala,S.C and Dalal,K.B.,Building Construction, Charotar Publishing House (2017).
6. Kerala Municipal Building Rules (latest revision)

19-200-0105B/19-200-0205A BASIC MECHANICAL ENGINEERING

Course Outcomes:

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

1. Understand basics of thermodynamics and working of steam turbines
2. Understand basics of internal combustion engines, refrigeration and air conditioning
3. Gain knowledge on the working of hydraulic turbines and centrifugal pumps
4. Identify manufacturing methods encountered in engineering practice and understand mechanism of power transmission

Module I
Thermodynamics: Thermodynamics systems – open, closed and isolated systems, equilibrium state of a system, property and state, process, cycle, Zeroth law of thermodynamics- concept of temperature, temperature scales. First law – internal energy, enthalpy, work and heat, Different processes (isobaric, isochoric, isothermal, adiabatic and polytropic processes). Second law – Kelvin-plank and Claussius statements and their equivalence, Carnot Cycle (Elementary problems only).
Thermodynamic properties of Steam, Steam Generator. Different types of boilers, boiler mountings and accessories. Formation of steam at constant pressure, working of steam turbines, compounding of turbines.

Module II
Internal Combustion Engines: Air standard cycles – Otto and Diesel cycles, working of two stroke and four stroke Petrol and Diesel engines, Carburetted and MPFI engines, fuel pump, fuel injector, ignition system, cooling system, lubricating system.
Refrigeration & Air-conditioning: Introduction to refrigeration and air -conditioning, Rating of refrigeration machines, Coefficient of performance, Simple refrigeration vapour compression cycle (Elementary problems only), Summer and winter air conditioning.

Module III
Hydraulic Turbines & Pumps: Introduction, Classification, Construction details and working of Pelton Wheel, Francis and Kaplan turbines, Specific speed (Definition and significance only), Classification of water pumps, working of centrifugal pumps and reciprocating pumps (Theory of working principles only)
Power plants: Hydro-electric power plants, Thermal power plants, Nuclear power plants, Diesel power plants, Wind mills, solar energy (Working principles using schematic representations only)

Module IV
 Introduction to Manufacturing Systems: Welding- different types of welding, resistance welding, arc welding, gas welding, Brazing and soldering, Different welding defects. Casting- different casting processes, sand casting, casting defects, Rolling- hot rolling and cold rolling, two high, three high , cluster rolling mills, wire drawing, forging, extrusion, Heat treatment of steel, elementary ideas of annealing, hardening, normalizing, surface hardening.
Power Transmission Methods and Devices: Introduction to Power transmission, Belt, Rope, Chain and Gear drive. Length of belt open and crossed. Ratio of belt tensions (Elementary

problems only). Different types of gears (Elementary ideas only). Types and functioning of clutches.

References

1. Nag, P.K. Engineering thermodynamics. (Fifth Edition). McGraw Hill Education (India) Pvt. Ltd, New Delhi.(2013).
2. Gill, J.H. Smith Jr. and Ziurys, E.J. Fundamentals of internal combustion engines, Oxford & IBH, New Delhi.(1959)
3. Stoecker, W. F. Refrigeration and air conditioning. Tata McGraw Hill, New Delhi. (1980).
4. JagadishLal. Hydraulic machines. Metropolitan Book co, New Delhi.(1994)
5. Raghavan, V. Material science and engineering, Prentice Hall of India, New Delhi. (2004)
6. Rajendar Singh.Introduction to basic manufacturing processes and workshop technology, New Age International, New Delhi. (2006).

19-200-0106B/19-200-0206A SOFT SKILLS DEVELOPMENT

Course Outcomes:
On completion of this course the student will be able to:
1. Speak English at the formal and informal levels and use it for daily conversation, presentation, group discussion and debate.
2. Read, comprehend and answer questions based on literary, scientific and technological texts
3. Develop self-motivation, raised aspiration, belief in one's own abilities and commitment to achieving one's goal
4. Demonstrate emotional maturity and emotional health.

Module I
Role and importance of verbal communication, Everyday active vocabulary, Common words used in transitions, enhancing vocabulary, affixes and changes in pronunciation and grammatical functions, words often confused in pronunciation and usage. Passage comprehension- skimming, scanning techniques, note making, note taking and summarizing. Deciphering meaning from contexts. Two types of meaning- literal and contextual. Constructive criticism of speeches and explanations.

Module II
Fundamental grammar, Simple structures, passivizing the active sentences, reported speech, the judicious use of tenses and moods of verbs, forming questions and conversion from questions to statements and vice versa, forming open –ended and close- ended questions. Words and style used for formal and informal communication. Practice converting informal language to formal, the diction and the style of writing. Dealing with the nuances of ambiguous constructions in language. Learning authoritative writing skills, polite writing and good netiquette. Writing for internships and scholarships.

Module III
Kinesics, Proxemics, Haptics, and other areas of non-verbal communication, fighting communication barriers, positive grooming and activities on the same.
Different types of interviews, and presentation - oral, poster, ppt. Organizing ideas for group discussions, the difference between GD and debates.
Effective listening and seeking to understand others' perspectives.Non-violent negotiation and persuasion, communicating across age groups, cultures or identity groups.
Higher order thinking and evaluation, information-seeking, research, and independent learning, synthesis, creativity, problem analysis and problem solving. Decision making, Self-reflection and learning from experience.

Module IV
Developing positive self: Understanding oneself, A realistic awareness of oneself and one's abilities, strengths and potential, Self-esteem, Self-efficacy, steps for improvement.
Intra-personal skills – Self-control, emotional regulation and self-discipline, conscientiousness, dutifulness, reliability, truthfulness, honesty and trustworthiness. Goal orientation and initiative. Time management – prioritising work.
Interpersonal skills – cross cultural competence and valuing diversity of perspectives, respecting and expressing concern for others. Empathy and ability to notice the effect of one's actions on others, tolerance for disagreement, conflict management and resolution.

Civic engagement and social responsibility – Global and local awareness (issues, challenges, priorities). Vision, ability to imagine something new or improved. Social responsibility and willingness to take constructive action.

References:
1. Duck, Steve and David T. Macmahan. Communication in Everyday Life. 3rd Ed. Sage, (2017).
2. Gamble, Kawl Teri and Michael W. Gamble. The Public Speaking Playbook. Sage, (2015).
3. Raman, Meenakshi and Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, (2015).
4. Coleman, D. Emotional intelligence: Why it can matter more than IQ, Bantam Books, New York (2006).
5. Devadas Menon. Stop sleep walking through life, Yogi Impressions Books Pvt. Ltd, Mumbai (2012).
6. Barun K Mitra. Personality Development and Softskills, Oxford University Press (2012).

ASSESSMENT

1. 'Soft Skills Development' is a practical and activity oriented course which has continuous assessment for 50 marks based on class room interaction, activities, and assignments. The activities may include 'Just a Minute' (JAM) sessions, group discussion, role play, debate, and extempore speech.

The weightages for the different components shall be as follows:

Class room interaction – 10 marks
Activities – 30 marks
Assignments (mainly from Modules I and II) – 10 marks

2. Semester End Examination is not envisaged.

3. A student should secure a minimum of 50% marks in continuous assessment for a pass in the course.

19-200-0107B/19-200-0207A CIVIL ENGINEERING WORKSHOP

Course Outcomes:
On completion of this course the student will be able to:
1. Identify simple plumbing and sanitary fittings and state its use
2. Identify the various methods used in building construction.
3. Construct brick walls using English Bond and Flemish Bond
4. Set out a building as per a given building plan using surveying instruments
5. Compute the various quantities of materials required for a building

Plumbing:
Introduction to simple plumbing and sanitary fittings.

Building Materials:
Familiarization of building materials and their testing.

Masonry:
Construction of English bond and Flemish bond – wall junction – one brick – one and a half brick –and two brick thick

Surveying:
Surveying and levelling instruments
Setting out of building (single room only) as per the given building plan using surveying instruments
Compute the area and/or volume of various features of a building/structure such as door and window size, number of bricks required to construct a wall of a building, diameter of bars used in windows etc. (to create an awareness of measurements and units)
Demonstration of Total Station

Assignment: *Students shall collect the list of various building materials used for the construction of a building including their market rate.*

19-200-0108B/19-200-0208A MECHANICAL ENGINEERING WORKSHOP

Course Outcomes:

On completion of this course the student will be able to:
1. Identify and use tools, and make different types of joints used in carpentry, fitting, and sheet metal shop.
2. Compare basic fabrication techniques of different types of welding.

Preliminary exercises for beginners in all the following shops. Specific models may be designed by the teachers.

1) Fitting Shop.
2) Sheet Metal Shop
3) Foundry Shop
4) Welding Shop
5) Carpentry Shop

19-200-0109B/19-200-0209A LANGUAGE LAB

Course Outcomes:

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

1. Test pronunciation skills through stress on word accent, intonation, and rhythm.
2. Use English language effectively for writing business letters, resume, minutes of meeting and reports.
3. Use English language effectively to face interviews, group discussions, and public speaking.

Following course content is prescribed for the **Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Preparing business letters
4. Preparing a resume
5. Conducting a meeting and writing the minutes
6. Writing a report
7. Situational Dialogues / Role Play.
8. Oral Presentations- Prepared and Extempore.
9. 'Just A Minute' Sessions (JAM).
10. Describing Objects / Situations / People.
11. Debate
12. Group discussion

19-200-0110B/19-200-0210A NSS/NATURE CONSERVATION ACTIVITIES

NATIONAL SERVICE SCHEME (NSS)

Course Outcomes:

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

1. Recognise the community in which they work
2. Utilise their knowledge in finding practical solution to individual and community problems

A student enrolling as member of NSS will have to complete 10 hours of training / social service.

NATURE CONSERVATION ACTIVITIES

Course Outcomes:

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

1. Practice and spread the message of sustainable life styles
2. Understand the importance of green plants in mitigating global environmental problems
3. Identify suitable waste management practices for the local community

A student enrolling as member of the Nature Conservation Club will have to complete 10 hours of campus cleaning and greening activities.

19-200-0101A/19-200-0201BCOMPUTER PROGRAMMING

Course Outcomes:
On completion of this course the student will be able to:
1. Identify main components of a computer system and explain its working.
2. Develop flowchart and algorithms for computational problems.
3. Write the syntax of various constructs of C language.
4. Build efficient programs by choosing appropriate decision making statements, loops and data structures.
5. Illustrate simple search and sort algorithms.
6. Demonstrate how to perform I/O operations in files for solving real world problems.
7. Design modular programs using functions for larger problems.

Module I

Basics of Computer and Information Technology:
Digital Computer System (CPU, Memory, I/O devices)- Working of a digital computer-Hardware and Software : Definition - Categories of Software, Application of Computers.
Problem Solving Methodology:
Problem statement, Analysis, Design a solution, Implement/Coding the solution, Test the solution, Design tools (Algorithm, Flow-chart, Pseudo-code)- Develop algorithms for simple problems.
Programming Languages:
Types of programming languages-Compiler–Interpreter-Linker–Loader–Execution of program.

Module II

Basics of C:
Character set-Identifier- Keywords- Constants –Data Types- Variables and declaration –Operators and Expressions – Operator precedence and associativity – Expression Evaluation (Simple Examples) - Input and output functions – Simple computational problems involving the above constructs.
Control Statements:
Selection, Conditional operator, Iteration (for, while, do-while), Branching (switch, break, continue, goto), Nesting of control statements- Problems using control statements.

Module III

Arrays and Strings:
1D and 2D arrays –Searching (Linear and Binary) - Sorting (Bubble, Selection) – Matrix manipulation programs – Strings and basic operations on strings – Strings functions -Programs on string manipulation.
Functions:
Definition – Calling – Declaration – Parameter Passing (by value and by reference) – Recursion – Programs based on functions.
User defined data types:
Structure – Union - Enumerated data type - Programs involving structure and union.

Module IV

Pointers:
Declaration, Initialization – Operations on pointers- Pointers and arrays – Pointers and Structures- Command line arguments-Dynamic memory allocation — Programs involving the above concepts.
Files:
File concept – File pointer – File handling operations (open, close, read, write etc) on sequential and random access files. Programs on file manipulations using fgetc(), fgets(),fseek().

References:

1. Pradip Dey and Manas Ghosh, Computer Fundamentals and Programming, Second Edition, Oxford University Press, (2013).
2. Byron Gottfried, Programming with C, Second edition, Tata McGraw-Hill, (2006).
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Second Edition, Pearson Education, (2001).
4. R.G. Dromey, How to solve it by Computer, Pearson Education, (2008).
5. Kanetkar Y, Let Us C, BPB Publications, (2007).

19-200-0102A/19-200-0202B ENGINEERING CHEMISTRY

Course Outcomes:
On completion of this course the student will be able to:
1. Interpret the basic principles and concepts of quantum mechanics
2. account for how spectroscopic methods can be used to determine molecular structures, with focus on the identification of characteristic groups in polyatomic molecules
3. Apply the laws of thermodynamics to engineering systems.
4. Explain the chemistry of a few important engineering materials and their industrial applications.

Module I
Quantum Chemistry: Schrodinger equation. Derivation from classical wave equation. Operator form of the equation. Application of Schrodinger equation to 1-D box solutions. Significance of wave functions, probability and energy. Application of 1-D box solutions to conjugated molecules.
Forms of hydrogen atom wave functions and the plots of these functions to explore their spatial variations.
Energy level diagrams of diatomic molecules, Pi-molecular orbitals of butadiene, and benzene and aromaticity.

Module II
Spectroscopy: Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine.
Vibrational and rotational spectroscopy of diatomic molecules. Applications.
Nuclear magnetic resonance and magnetic resonance imaging.
Surface characterisation techniques. Diffraction and scattering.

Module III
Chemical Thermodynamics: Fundamentals. First law of thermodynamics. Molecular interpretation of internal energy, enthalpy and entropy. Heat of reaction. Kirchoff's equations. Dependence on pressure and temperature. Gibbs-Helmholtz equation. Free energy changes and equilibrium constant. Chemical potential and fugacity. Thermodynamics of biochemical reactions.
Phase Rule: Terms involved in phase rule and examples, Application of phase rule to one component water system, Application of phase rule to two-component systems. (Simple eutectic systems).

Module IV
Engineering materials:
Polymers- Classifications- Mechanism of polymerisation (Addition, free radical, cationic, anionic and coordination polymerisation)- Thermoplastics and thermosetting plastics-Compounding of plastics-Moulding techniques of plastics (Compression, Injection, Transfer and Extrusion moulding)-Preparation, properties and uses of PVC, PVA, PET, Nylon- Silicon polymers- Biodegradable plastics. Elastomers- structure of natural rubber- vulcanisation-synthetic rubbers (Buna-S, Butyl rubber and Neoprene).

Lubricants- Introduction-Mechanism of lubrication- solid and liquid lubricants- Properties of lubricants-Viscosity index- flash and fire point- cloud and pour point- aniline value.
Refractories: Classification – Properties of refractories.
Cement- Manufacture of Portland cement- Theory of setting and hardening of cement.

References:
1. B. H. Mahan and R. J. Meyers University Chemistry, 4th Edition, Pearson publishers. (2009).
2. Peter W. Atkins, Julio de Paula, and James Keele. Physical Chemistry, 11th Edition, Oxford publishers. (2018).
3. M. J. Sienko and R. A. Plane. Chemistry: Principles and Applications, 3rd Edition, McGraw-Hill publishers.(1980).
4. C. N. Banwell. Fundamentals of Molecular Spectroscopy, 5th Edition, McGraw-Hill publishers.(2013).
5. B.L. Tembe, M.S. Krishnan and Kamaluddin. Engineering Chemistry (NPTEL Web Course)
6. Shashi Chawla. A Text book of Engineering Chemistry. Dhanpat Rai & Co, New Delhi.(2013).

Course Outcomes:
On completion of this course, the students will be able to:
1. Prepare drawings as per Indian standards
2. Produce orthographic projection of straight lines and planes.
3. Draw orthographic projection of solids.
4. Understand development of surface of different geometric shapes
5. Construct isometric scale, isometric projections and views.

Module I
Introduction to engineering graphics. Drawing instruments and their use. Familiarisation with current Indian Standard Code of Practice for general engineering drawing.
Scales- plain scale, Vernier scale, diagonal scale.
Conic sections- Construction of ellipse, parabola, hyperbola - construction of cycloid, involute, Archimedian spiral and logarithmic spiral- drawing tangents and normal to these curves.

Module II
Introduction to orthographic projections- plane of projection- principles of first angle and third angle projections, projection of points in different quadrants.
Orthographic projection of straight lines parallel to one plane and inclined to the other plane- straight lines inclined to both the planes- true length and inclination of lines with reference planes- traces of lines.
Projection of plane laminae of geometrical shapes in oblique positions.

Module III
Projection of polyhedra and solids of revolution- frustum, projection of solids with axis parallel to one plane and parallel or perpendicular to other plane- projection of solids with axis inclined to both the planes- projection of solids on auxiliary planes.
Section of solids by planes inclined to horizontal or vertical planes- true shape of sections.

Module IV
Development of surface of cubes, prisms, cylinders, pyramids and cones
Intersection of surfaces- methods of determining lines of intersection - intersection of prism in prism and cylinder in cylinder.

Module V
Introduction to isometric projection- isometric scales, isometric views- isometric projections of prisms, pyramids, cylinders, cones and spheres.
Introduction to perspective projections: visual ray method and vanishing point method- perspective of circles- perspective views of prisms and pyramids.

References:
1. John, K.C. Engineering graphics. PHI Learning, New Delhi.(2013)
2. Bhat, N.D. Elementary engineering drawing. (Forty ninth edition). Charotar Publishing House, Anand.(2010)
3. Gill P.S. Geometric drawing. B.D Kataria &Sons, Ludhiana.(2012)

Type of questions for Semester End Examination
Two questions of 12 marks each from Module I with option to answer any one. (1 x 12 = 12)
Two questions of 15 marks each from Module II, Module III, Module IV and Module V with option to answer any one question from each module. (4 x 15 = 60).

19-200-0104A/19-200-0204B BASIC ELECTRICAL ENGINEERING

Course Outcomes:
On completion of this course the student will be able to:
1. Analyse and solve electric circuits
2. Understand the principles of electromagnetic induction and identify meters for measuring electrical quantities
3. Recognise the basic elements and phases in AC circuits
4. Identify the type of electrical machine for a given application

Module I
Basic principles of Electric circuits: Review of Ohm's law - Definition of Resistance, Current, Voltage and Power - Series and Parallel circuits- Constant voltage source and Constant current source.
Network Theorems: Kirchhoff's laws- Network analysis by Maxwell's circulation currents - Superposition theorem -Thevenin's theorem - Norton's theorem - simple illustrative problems on network theorems.
Review of electrostatics - Coulomb's Law- Electric field strength and electric flux density, Capacitance.

Module II
Review of electromagnetic induction -Faraday's Law- Lenz's Law - Mutually induced emf. Magnetic circuits - Magnetic field of a coil - Ampere turns calculation - Magnetic flux - Flux density - Field strength.
Measuring instruments: Working principle of galvanometer, Ammeter, Voltmeter, Watt meter & Energy Meter (elementary concepts).

Module III
AC Fundamentals: Sinusoidal Alternating Waveforms - Sinusoidal AC Voltage characteristics and definitions — General representation of voltage or current – Phase Relations – Average value – Effective (Root mean square) value.
The Basic Elements and Phasors: Response of basic R, L and C elements to a sinusoidal voltage or current –Phasor diagrams, Frequency response of the basic elements – Average power and power factor – Complex representation of vectors (Rectangular & polar forms)
Series and Parallel ac Circuits: Series & parallel impedances and admittances, Analysis of RL, RC & RLC circuits, Resonance in series and parallel circuits- Variation of impedance and admittance in series and parallel resonant circuits. Power in ac circuits: active, reactive & apparent power.
Introduction to 3 phase Systems: Star& Delta connection, Power in three phase circuits

Module IV
Electrical Machines: Principle of operation, Types and applications of DC machines, Transformers and Induction Machines. (Only an elementary qualitative treatment is envisaged.)
Elementary Concepts of Generation, Transmission, and Distribution: Conventional sources of electrical energy: Hydro, Thermal, Nuclear and Diesel power station, Non-conventional Sources: Solar energy, wind energy & energy from oceans, Various levels of power transmission, introduction to primary and secondary distribution

References:

1. Robert L. Boylestad. Introductory circuit analysis. (Twelfth edition). Pearson Education, New Delhi. (2012)
2. Cotton, H. Electrical technology. (Seventh edition). CBS Publishers and Distributors, New Delhi. (2005)
3. Leonard S. Bobrow. Fundamentals of electrical engineering. Oxford University Press, New Delhi.(1996).
4. Rajendra Prasad. Fundamentals of electrical engineering. (Second edition). PHI Learning, New Delhi.(2009)
5. Edward Hughes. Electrical technology. Addison Wesley Longman, Boston. (1995).

19-200-0105A/19-200-0205B BASIC ELECTRONICS ENGINEERING

Course Outcomes:

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

1. Develop an understanding of the behaviour of semiconductor junctions, diodes and BJTs
2. Familiarize with the applications of Diodes in rectification and regulation
3. Relate the role of BJTs in amplification and switching
4. Identify various measuring instruments and their functions
5. Gain knowledge on the fabrication of semiconductor devices and ICs

Module I:

Basic Semiconductor and PN Junction Theory: Atomic Theory, Conduction in Solids, Conductors, Semiconductors and Insulators, n-Type and p-Type semiconductors, Semiconductor conductivity
The p-n Junction, Biased Junctions. Junction Currents and Voltages

Module II:

Semiconductor Diodes and Applications: PN Junction Diode, Characteristics and parameters, Diode Approximations, DC Load Line Analysis, Temperature Effects, Diode AC Models, Diode Specifications, Diode Testing, Zener Diodes
Half wave rectification, Full wave rectification, RC and LC Filters, Shunt Voltage Regulators, Power supply - performance and Testing
Optoelectronic Devices-LED, LCD, Seven segment displays

Module III:

Bipolar Junction Transistors and Electronic measuring instruments: BJT Operation, BJT voltages and currents, BJT Amplification and Switching, Common Base, Common Emitter and Common Collector Characteristics, Transistor Testing
Electronic measuring instruments – Power Supply, Function Generator, CRO, Multimeter.

Module IV:

Fabrication of Semiconductor Devices and ICs: Processing of Semiconductor materials, Diode Fabrication and Packaging, Transistor construction and Performance, Transistor Fabrication, Integrated Circuits, IC components and circuits, Transistor and IC packaging, Transistor Data sheets, Power measurement in dB

References:

1. David A Bell, Electronic Devices and Circuits Oxford Higher Education, 5th Edition, (2017).

2. NN Bhargava, DC Kulshreshtha, SC Gupta, Basic Electronics and Linear circuits, Tata McGrawHill Publishing Company, 2nd Edition, (2013).

19-200-0106A/19-200-0206B ENVIRONMENTAL STUDIES

Course Outcomes:
On completion of this course the student will be able to:
1. Identify the natural resources and suitable methods for conservation and sustainable development
2. Realise the importance of eco system and biodiversity for maintaining ecological balance
3. Identify environmental pollutants and abatement mechanisms
4. Understand environmental problems arising due to developmental activities and population growth

Module I
Multidisciplinary nature of environmental studies. Definition, scope and importance, need for public awareness.
Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.   Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Module II
Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems: - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. Inida as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Module III
Environmental Pollution: Definition. Cause, effects and control measures of: - a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

Diaster management: floods, earthquake, cyclone and landslides.
Environmental legislation: Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation.

Module IV
Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products.
Social Issues and the Environment: From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case Studies. Public awareness.
Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies.
Field work: Visit to a local area to document environmental assets river/ forest/grassland/hill/ mountains. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

References:

1. Rajagopalan, R. Environmental studies: From crisis to cure. Oxford University Press, New Delhi. (2005).
2. Erach Bharucha. Textbook of environmental studies and ethics. Universities Press (India), Hyderabad. (2005).
3. Jayashree A. Parikh. Balsaraf, V.M. and Dwivedi, P.B. Environmental studies. Ane Books Pvt. Ltd, New Delhi. (2010)
4. Anindita Basak. Environmental studies, Pearson, New Delhi. (2009).
5. Misra, S.P. (2011). Essential environmental studies. (Third edition). Ane Books Pvt. Ltd., New Delhi. (2011).
6. Benny Joseph. Environmental science & engineering, Tata McGraw Hill Education Pvt. Ltd., New Delhi. (2010).

19-200-0107A/19-200-0207B ELECTRICAL ENGINEERING WORKSHOP

Course Outcomes:

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

1. Apply basic electrical engineering knowledge for house wiring practice

Experiments:

1. One lamp controlled by one switch
2. Series and parallel connections of lamps.
3. Stair case wiring.
4. Hospital Wiring.
5. Godown wiring.
6. Fluorescent lamp.
7. Connection of plug socket.
8. Different kinds of joints.
9. Winding of transformers.
10. Soldering practice.
11. Familiarisation of CRO.
12. Single Phase Distribution Board Wiring.

19-200-0108A/19-200-0208B COMPUTER PROGRAMMING LABORATORY

Course Outcomes:
On completion of this course the student will be able to:
1. Solve problems efficiently by choosing loops and decision making statements in C programming.
2. Implement different operations on arrays.
3. Solve problems using functions and recursion.
4. Design and implement C programs using the concepts of structure, pointers and files.

Cycle I
Application Packages:
Text Editor
1. To create a word document like an advertisement.
Spread Sheet
2. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts.
Presentation Software
3. To create a presentation for the department using Power Point.
C Programming Basics:
4. To write a program to calculate and display areas of rectangle and triangle.
Decision Making:
5. To write a program for electricity bill preparation.
6. To write a program to find the roots of a quadratic equation.
7. To write a simple menu driven calculator program using switch statement.
8. To write a program to find the sum of digits of a given number.

Cycle II
Looping:
9. To write a program to print all the prime numbers of a given range.
10. To write a program to print the sine and cosine series.
11. To write a program to print Pascal's triangle.
Arrays:
12. To write a program to print the sum and average of elements in an array.
13. To write a program to sort the given numbers using bubble sort.
14. To write a program to perform Matrix addition and matrix multiplication.
String:
15. To write a program to perform string manipulation functions like string concatenations, comparison, find the length and string copy without using library functions.
16. To write a program to arrange names in alphabetical order.
Cycle III
Functions:
17. To write a C program to calculate the mean, variance and standard deviation using functions.
18. To write a C program to perform sequential and binary search using functions.
Recursion:
19. To write a program to print the Fibonacci series using recursive function.
20. To write a program to print the factorial of the given number using recursive function.

Structure:
21. To print the mark sheet of n students using structures.
Pointers:
22. To write a program using pointers to access the elements of an array and count the number of occurrences of the given number in the array.
Files:
23. To write a program to count the number of characters,lines in a file.

References:
1. Pradip Dey and Manas Ghosh, Computer Fundamentals and Programming in C, Second Edition, Oxford University Press, (2013).
2. Smarajit Ghosh, All of C, PHI Learning Pvt. Ltd, (2009).
3. Byron Gottfried, Programming with C, 2 nd edition, Tata McGraw-Hill, (2006).
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Second Edition, Pearson Education, (2001).
5. Sukhendu Dey, Debobrata Dutta, Complete Knowledge in C, Narosa PublishingHouse, New Delhi, (2009).