



AMRITA
VISHWA VIDYAPEETHAM

Bachelor of Science
PROGRAM
Physics, Mathematics,
Computer Science
(PMC)

Faculty of Sciences
(With effect from 2018)

Introduced in 2018-2019

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Programme Outcome

PO1	Broad foundation in Chemistry: Broad foundation in the various branches of chemistry and develop scientific reasoning and problem-solving skills in chemistry from a molecular perspective.
PO2	Rigorous understanding of theories and principles of Physics: Rigorous understanding of principles and methods in physics and their application to problem solving.
PO3	Laboratory skills: Enhanced critical thinking ability and improved skills in the design, interpretation and documentation of experiments.
PO4	Quantitative skills: Improved ability to interpret and analyze quantitative data.
PO5	Analytical and Numerical skills: Ability to apply mathematical methods to understand concepts and solve problems in physics and chemistry.
PO6	Computational thinking and problem solving: Ability to solve complex problems by the application of computers.
PO7	Research Aptitude: Develop critical thinking and objective analysis and ability to solve scientific problems.

Programme Specific Outcome

PSO1	Foundation in Physical Sciences: Broad understanding of the principles of physics and chemistry and their application in problem solving.
PSO2	Critical thinking and Research Aptitude: Develop objective thinking and ability to critically appraise the concepts of science and to propose ideas to improve existing knowledge.
PSO3	Mathematical and numerical skills: Improve mathematical skills and the ability to apply of mathematical and numerical techniques to gain deeper understanding of physics and chemistry.

PSO4	Computational skills: Basic understanding of the application of computational methods for problem solving.
PSO5	Scientific writing and communication: Develop oral and written communication skills for dissemination of scientific investigations and results.

R.13 Assessment Procedure

R.13.1 The academic performance of each student in each course will be assessed on the basis of Internal Assessment (including Continuous Assessment) and an end-semester examination.

Normally, the teachers offering the course will evaluate the performance of the students at regular intervals and in the end-semester examination.

In theory courses (that are taught primarily in the lecture mode), the weight for the Internal Assessment and End-semester examination will be 50:50. The Internal assessment in theory courses shall consist of at least two periodical tests, weekly quizzes, assignments, tutorials, viva-voce etc. The weight for these components, for theory-based courses shall be 20 marks for the Continuous assessment, comprising of Quizzes, assignments, tutorials, viva-voce, etc. and 15 marks each for both the Periodical Tests.

At the end of the semester, there will be an end-semester examination of three hours duration, with a weight of 50 marks, in each lecture-based course.

R.13.2 In the case of laboratory courses and practical, the relative weight for Internal assessment and End-semester examination will be 80:20. The weight for the components of Internal assessment will be decided by the course committee/class committee at the beginning of the course.

Evaluation pattern for course having both Theory and Lab. components:

Courses having only one hour per week for lecture/tutorial, be treated as a Lab. course, for evaluation purposes; and evaluation pattern will be 80 marks for continuous assessment of lab. work and 20 marks for end-semester lab. examination.

Courses having two hours per week for theory and/or tutorials, be given a weight of 60 marks and 40 marks for the Theory and Lab. components, respectively; The Lab. Component evaluation will be based on continuous evaluation, without any end-semester practical evaluation. 10 marks will be for continuous assessment of the theory portion, 10 marks for each of the two periodical tests, 30 marks for the theory end-semester examination and 40 marks for continuous assessment of lab. Work and Courses having three hours per week for theory and/or tutorials, be given a weight of 70 marks and 30 marks for the Theory and Lab. components, respectively; The Lab. component evaluation will be based on continuous

evaluation, without any end semester practical evaluation. 15 marks will be for continuous assessment of the theory portion, 10 marks for each of the two periodical tests, 35 marks for the theory end-semester examination and 30 marks for continuous assessment of lab. work.

R.13.3 It is mandatory that the students shall appear for the end-semester examinations in all theory and practical courses, for completion of the requirements of the course. Those who do not appear in the end-semester examinations will be awarded 'F' grade, subject to meeting the attendance requirement.

At the end of a semester, examinations shall be held for all the subjects that were taught during that semester and those subjects of the previous semesters for which the students shall apply for supplementary examination, with a prescribed fee.

R.13.4 PROJECT WORK: The continuous assessment of project work will be carried out as decided by the course committee. At the completion of the project work, the student will submit a bound volume of the project report in the prescribed format. The project work will be evaluated by a team of duly appointed examiners.

The final evaluation will be based on the content of the report, presentation by student and a viva-voce examination on the project.

There will be 40% weight for continuous assessment and the remaining 60% for final evaluation.

If the project work is not satisfactory he/she will be asked to continue the project work and appear for assessment later.

R.14 PUBLICATION / INTERNSHIP

R.14.1 All students, if they are to be considered for award of Distinction at the time of graduation, are required to have published ONE paper in Scopus-indexed Journal/Conference.

Students with 8.0 and above CGPA from the UG Programme of Visual Media, at the end of the course, producing an output like Video Production / Animation / Portfolio / Graphic Output / Feature / Documentary / Programme etc. and the same to be judged by a panel which consists of at least ONE industry / Academic External Expert identified by the Department can be considered in lieu of mandatory publication.

R.14.2 Additional 10 marks will be awarded for each Publication, subject to a maximum of ONE paper per semester.

The additional marks shall be awarded in the semester in which the paper is published or presented, if applied for, within 10 days of the publication of results of the concerned semester. The additional marks can be awarded to any course(s) where the student has to improve his/her grade.

R.14.3 All publications shall be in Scopus-indexed Journals/Conferences and shall be as per the guidelines prescribed by the University.

R.14.4 Students who have undergone Internship at reputed organisations or National / International Institutions, with the prior approval of the concerned Departmental Chairperson and the Head of the School, may be considered for waiver of the requirement of publication, for the award of Distinction. However, the decision of the Departmental Chairperson and the Head of the concerned School, in this regard, shall be final.

R.14.5 Co-curricular Activities

The students during their period of study in the University are encouraged to indulge in sports, arts, Social/Community service and Seva activities. Bonus marks (5 to 10 marks) shall be awarded for representing AMRITA University in Sports, Cultural and Seva activities. The procedure for awarding these marks will be published by the University from time to time.

R.15 REMEDIAL PROVISIONS

R.15.1 Supplementary Examinations:

Students failed in a non-semester course (i.e. courses not registered by the student during the current semester), shall apply for appearance in the respective examination by paying a prescribed fee and take the examination.

A student who has secured an 'F' grade in a course may take the supplementary examination for a maximum of three additional attempts (excluding the regular end-semester examinations) carrying the previous Internal marks earned by them. Students failing to pass the course after three additional attempts shall henceforth appear for the supplementary examination for the entire 100 marks and the Internal assessment marks earned by them in the regular registration, shall not be considered.

If a student wishes to improve his/her internal marks, he/she can do so, by re-registering for the course by choosing any of the appropriate remedial options. In this case, the internal marks obtained by the student will be valid for the end-semester of the reregistration and three more additional attempts.

R.15.2 Other options:

Certain courses may be offered as run-time-redo or as contact courses, as and when necessary to enable students who have dropped courses or failed in some courses, to register and endeavor to complete them.

a) **Re-registration:** Students who have failed in a course and opt to re-do the course may do so by re-registering for the course, along with a junior batch of students,

b) **Run-time re-do:** Certain courses may be offered specially for the benefit of failed students during the semester, on a regular pattern.

The above two modes, enable possible improvement of the Internal assessment marks.

c) **Contact courses:** Final-semester students and term-out students (students who have completed three-year period) may register for contact mode, to clear the failed courses, if any, subject to the approval of the Head of the School.

A maximum of only two courses, can be taken under contact mode, in the entire programme of study.

R.15.3 Supplementary examinations will be evaluated against the most recent grade rule (whenever the course was offered recently in the regular semester).

R.16 Grading

R.16.1 Based on the performance in each course, a student is awarded at the end of the semester, a letter grade in each of the courses registered.

Letter grades will be awarded by the Class Committee in its final sitting, without the student representatives.

The letter grades, the corresponding grade points and the ratings are as follows:

Letter Grade Grade Points Ratings

O	10.00	Outstanding
A+	9.50	Excellent
A	9.00	Very Good
B+	8.00	Good
B	7.00	Above Average
C	6.00	Averages
P	5.00	Pass
F	0.00	Fail
FA	0.00	Failed due to insufficient attendance
I	0.00	Incomplete (awarded only for Lab.courses/ Project / Seminar)
W		Withheld

R.16.2 'FA' grade once awarded stays in the record of the student and is replaced with the appropriate grade when he/she completes the course successfully later.

Students who have secured an 'FA' in a course must re-register for the course or register for the course, if offered, under run-time re-do mode.

R.16.3 A student who has been awarded 'I' Grade in a Lab course, due to reasons of not completing the Lab., shall take up additional Lab. whenever offered next and earn a pass grade, which will be reflected in the next semester's grade sheet.

The 'I' grade, awarded in a Project/Seminar course, will be subsequently changed into appropriate grade, when the student completes the requirement during the subsequent semester. If he/she does not complete it in the next semester, it will be converted to 'F' grade.

R.16.4 A student is considered to have successfully completed the course and earned the credit, if he/she scores a letter grade 'P' or better in that course.

R.17 Declaration of Result

After finalization of the grades by the Class Committee and subsequent approval of the Head of the School, the result will be announced by the Controller of Examinations.

R.18 Revaluation of answer Papers

On publication of the results, an aggrieved student can request for revaluation of answers scripts of the end-semester examination, within five working days of publication of the results, along with the prescribed revaluation fees. The request has to be made to the Examination Section, through the Head of the School.

If the revaluation leads to a better grade, the revised grade will be awarded to the student and in such cases, the revaluation fee will be refunded in full. Revaluation is permitted only for lecture-based courses.

R.19 Course completion:

A student is said to have successfully completed a course and earned the corresponding credits, if he/she has:

- ☑ registered for the course :
- ☑ put in 75% or more attendance in the course,
- ☑ appeared for the end-semester examinations,
- ☑ obtained a pass grade 'P' or better in the course,
- ☑ no pending disciplinary proceedings against him/her.

R.20 Grade Sheet

The Grade Sheet issued to the student at the end of a semester will contain the following information:

- ☑ Name, Roll No. Grade Sheet No., Semester, Branch, Month and year of the Examination,
- ☑ Course Code, Course Title, Credits, Grade obtained and Grade points earned for the courses registered,
- ☑ Credits registered and earned during the semester,
- ☑ Cumulative credits earned and Grade Points,
- ☑ SGPA and
- ☑ CGPA.

R.21 Semester Grade Point Average (SGPA)

On completion of a semester, each student is assigned Semester Grade Point Average (SGPA)

which is computed as below for all courses registered by the student during that semester:

$$SGPA = \frac{\sum C_i G_{pi}}{\sum C_i}$$

where C_i is the credit for i^{th} course in that semester and G_{pi} is the grade point for that course.

The summation is over all the courses registered by the student during the semester, including the failed courses. The SGPA is rounded off to two decimals.

R.22 Cumulative Grade Point Average (CGPA)

The overall performance of a student at any stage of the Degree programme is evaluated by the Cumulative Grade Point Average (CGPA) up to that point of time.

$$CGPA = \frac{\sum C_i G_{pi}}{\sum C_i}$$

where C_i is the credit for i^{th} course in that semester and G_{pi} is the grade point for that course.

The summation is over all the courses registered by the student during all the semesters up to that point of time, including the failed courses. The CGPA is also rounded off to two decimals.

R.23 Ranking

The ranking of the students in a batch at any intermediate or final stage is based on CGPA. Only those students who have passed all courses up to that stage in the first attempt are considered for ranking.

Students are eligible for final ranking, only if they complete the programme within the normal duration, i.e., within three years from joining the programme.

R.24 Classification of successful candidates:

R.24.1 A student shall be considered to have successfully completed the programme, if he/she has:

- i) registered and successfully completed all the core courses, electives and projects as mentioned in the curriculum;
- ii) earned the required minimum number of credits as specified in the curriculum corresponding to the programme, within the stipulated time;

R.24.2 Candidates who have successfully completed the programme, within a period of six semesters from entering the programme, shall be classified as follows:

Candidates securing a CGPA of 8.00 and above – **FIRST CLASS WITH DISTINCTION***

Candidates securing a CGPA between 6.50 and 7.99 – **FIRST CLASS** and the same be mentioned in the Degree certificate;

(*subject to satisfying the condition mentioned at R.14.1 and having passed all the courses, in the first attempt, in six semesters, from the date of joining for the programme)

If the programme is completed after six semesters of study, the candidates securing even a CGPA of 8.00 and above, shall be classified to have completed the programme, only with **FIRST CLASS**.

R.25 Transcript

The Controller of Examinations will also issue, on request and payment of a prescribed fee, a detailed transcript with his signature or facsimile to every student after completion of the programme. It shall contain all the information that is contained in the grade sheets.

Additionally, it shall also include the month and year of passing each course. The transcript card shall contain only the final grades secured, but will not indicate the earlier failures, if any. The detailed transcript, will contain the CGPA and the class, if any obtained.

B.Sc. (Physics, Mathematics, Computer Science) - Curriculum

Course Code	Semester I	L T P	Credit	Course Code	Semester II	L T P	Credit
18ENG101	Communicative English	2 0 2	3	18ENG121	Professional Communication	1 0 2	2
	Language I	1 0 2	2		Language II	1 0 2	2
18CUL101	Cultural Education	2 0 0	2	18CUL111	Cultural Education	2 0 0	2
18PHY103	Physics Paper I Mechanics	3 0 2	4	18PHY112	Physics Paper II Waves, Heat and Thermodynamics	3 0 2	4
18MAT101	Mathematics Paper I Calculus	3 1 0	4	18MAT118	Mathematics Paper II Matrices and Vector Calculus	3 1 0	4
18CSA104	Computer Science Paper I Computer Fundamentals and C Programming	3 0 2	4	18CSA115	Computer Science Paper II Basics of Computer Networks and Web Technology	3 0 2	4
18ENV300	Environmental Studies	3 0 0	3	18LAW201	Indian Constitution	2 0 0	2
	Subtotal		22		Subtotal		20
Course Code	Semester III	L T P	Credit	Course Code	Semester IV	L T P	Credit
18AVP201	Amrita Value Programme	1 0 0	1	18AVP211	Amrita Value Programme	1 0 0	1
18PHY202	Physics Paper III Electricity and Magnetism	3 0 2	4	18PHY215	Physics Paper IV Optics	3 0 2	4
18MAT201	Mathematics Paper III Differential Equations	3 1 0	4	18MAT222	Mathematics Paper IV Modern Algebra	3 1 0	4
18CSA204	Computer Science Paper III Object Oriented Programming	3 0 2	4	18CSA213	Computer Science Paper IV Data Base Management Systems	3 0 2	4
18SSK201	Life Skills I	1 0 2	2		Open Elective	3 0 0	3
	Open Elective	3 0 0	3	18SSK211	Life Skills II	1 0 2	2
	Elective A	3 0 0	3		Elective B	3 0 0	3
18CSA205	MIS	2 0 0	2				
	Subtotal		23		Subtotal		21
Course Code	Semester V	L T P	Credit	Course Code	Semester VI	L T P	Credit
18PHY305	Physics Paper V Basic Electronics	3 0 0	3	18PHY316	Physics Paper VII Atomic and Molecular Physics	3 0 0	3
18PHY381	Physics Paper VI - Practical paper Practicals	0 1 2	2	18PHY381	Physics Paper VIII - Practical paper	0 1 2	2

					Practicals		
18MAT301	Mathematics Paper V Real Analysis	2 1 0	3	18MAT632	Mathematics Paper VII Complex Analysis	2 1 0	3
18MAT112	Mathematics Paper VI Discrete Mathematics	1 1 0	2	18MAT202	Mathematics Paper VIII Probability and Statistics	1 1 0	2
18CSA304	Computer Science Paper V Introduction to Data Structures and Algorithms	3 0 0	3	18CSA314	Computer Science Paper VII System Programming and Operating System	3 0 0	3
18CSA381	Computer Science Paper VI - Practical Paper Data Structures and Algorithms Lab	0 1 2	2	18CSA382	Computer Science Paper VIII - Practical Paper System Programming and Operating System Lab	0 1 2	2
18SSK301	Life Skills III	1 0 2	2	18SCI399	Project		6
	Elective C	3 0 0	3				
	Elective D	3 0 0	3				
	Subtotal		23		Subtotal		21
Total Credits till VI Semester – 130							
	Electives : Physics				Electives: Mathematics		
18PHY331	Medical Physics			18MAT341	Operations Research		
18PHY332	Renewable Energy and Energy Harvesting			18MAT342	Numerical Methods		
18PHY333	Introduction to Nanophysics and Applications			18MAT343	Integral Transforms and Fourier Series		
18PHY334	Physics of the Atmosphere			18MAT344	Applied Statistics		
18PHY335	Biophysics			18MAT345	Number Theory		
18PHY336	Space Physics			18MAT346	Special Functions		
	Electives: Computer Science						

18CSA361	Software Engineering						
18CSA362	Theory of Computation						
18CSA363	Design and Analysis of Algorithm						
18CSA364	Compiler Design						
18CSA365	Distributed Computing						
18CSA366	Data Mining						

B.Sc. (Physics, Mathematics, Computer Science)

SEMESTER I

18AVP201/	Amrita Values Programme I/	1 0 0 1
18AVP211	Amrita Values Programme II	1 0 0 1

Objective:

To give exposure to students about Richness and beauty of the Indian way of life. To make students familiar with rich tapestry of Indian life culture, arts, Science and heritage which was historically drawn people from all over the world.

Course outcome:

CO1. Understanding of various attributes which make a man complete
CO2. Pay obedience to elders
CO3. Respect women
CO4. Valuing good even in enemies.

Amrita University's Amrita Values Programme (AVP) is a new initiative to give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.

Amrita Values Programmes emphasize on making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

Students shall have to register for any two of the following courses, one each in the third and the fourth semesters, which may be offered by the respective school during the concerned semester.

Courses offered under the framework of Amrita Values Programmes I and II

Message from Amma's Life for the Modern World

Amma's messages can be put to action in our life through pragmatism and attuning of our thought process in a positive and creative manner. Every single word Amma speaks and the guidance received in on matters which we consider as trivial are rich in content and touches the very inner being of our personality. Life gets enriched by Amma's guidance and She teaches us the art of exemplary life skills where we become witness to all the happenings around us still keeping the balance of the mind.

Lessons from the Ramayana

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

Lessons from the Mahabharata

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

Lessons from the Upanishads

Introduction to the Upanishads: Sruti versus Smrti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, SatyakamaJabala, Aruni, Shvetaketu.

Message of the Bhagavad Gita

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

Life and Message of Swami Vivekananda

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

Life and Teachings of Spiritual Masters India

Sri Rama, Sri Krishna, Sri Buddha, AdiShankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda, Sri RamanaMaharshi, Mata Amritanandamayi Devi.

Insights into Indian Arts and Literature

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

Yoga and Meditation

The objective of the course is to provide practical training in YOGA ASANAS with a sound theoretical base and theory classes on selected verses of Patanjali's Yoga Sutra and Ashtanga Yoga. The coverage also includes the effect of yoga on integrated personality development.

Kerala Mural Art and Painting

Mural painting is an offshoot of the devotional tradition of Kerala. A mural is any piece of artwork painted or applied directly on a wall, ceiling or other large permanent surface. In the contemporary scenario Mural painting is not restricted to the permanent structures and are being done even on canvas. Kerala mural paintings are the frescos depicting mythology and legends, which are drawn on the walls of temples and churches in South India, principally in Kerala. Ancient temples, churches and places in Kerala, South India, display an abounding tradition of mural paintings mostly dating back between the 9th to 12th centuries when this form of art enjoyed Royal patronage. Learning Mural painting through the theory and practice workshop is the objective of this course.

Course on Organic Farming and Sustainability

Organic farming is emerging as an important segment of human sustainability and healthy life. 'Haritamritam' is an attempt to empower the youth with basic skills in tradition of organic farming and to revive the culture of growing vegetables that one consumes, without using chemicals and pesticides. Growth of Agriculture through such positive initiatives will go a long way in nation development. In Amma's words "it is a big step in restoring the lost harmony of nature".

Benefits of Indian Medicinal Systems

Indian medicinal systems are one of the most ancient in the world. Even today society continues to derive enormous benefits from the wealth of knowledge in Ayurveda of which is recognized as a viable and sustainable medicinal tradition. This course will expose students to the fundamental principles and philosophy of Ayurveda and other Indian medicinal traditions.

Traditional Fine Arts of India

India is home to one of the most diverse Art forms world over. The underlying philosophy of Indian life is 'Unity in Diversity' and it has led to the most diverse expressions of culture in India. Most art forms of India are an expression of devotion by the devotee towards the Lord and its influence in Indian life is very pervasive. This course will introduce students to the deeper philosophical basis of Indian Art forms and attempt to provide a practical demonstration of the continuing relevance of the Art.

Science of Worship in India

Indian mode of worship is unique among the world civilizations. Nowhere in the world has the philosophical idea of reverence and worshipfulness for everything in this universe found universal acceptance as it in India. Indian religious life even today is a practical demonstration of the potential for realization of this profound truth. To see the all-pervading consciousness in everything, including animate and inanimate, and constituting society to realise this truth can be seen as the epitome of civilizational excellence. This course will discuss the principles and rationale behind different modes of worship prevalent in India.

Temple Mural Arts in Kerala

The traditional percussion ensembles in the Temples of Kerala have enthralled millions over the years. The splendor of our temples makes art enthusiast spellbound, warmth and grandeur of color combination sumptuousness of the outline, crowding of space by divine or heroic figures often with in vigorous movement are the characteristics of murals.

The mural painting specially area visual counterpart of myth, legend, gods, dirties, and demons of the theatrical world, Identical myths are popular the birth of Rama, the story of Bhīma and Hanuman, Shiva, as Kirata, and the Jealousy of Uma and ganga the mural painting in Kerala appear to be closely related to, and influenced by this theatrical activity the art historians on temple planes, wood carving and painting the architectural plane of the Kerala temples are built largely on the pan-Indians almost universal model of the Vasthupurusha.

Organic Farming in Practice

Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of synthetic fertilizers, sewage sludge, irradiation, and genetic engineering. This factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

Ayurveda for Lifestyle Modification:

Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and nonliving) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre- industrial herbal heritage.

Life Style and Therapy using Yoga

Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect

comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.

Insights into Indian Classical Music

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala,- Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

Insights into Traditional Indian Painting

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Six limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriya, Rajput, Tanjore etc.

Insights into Indian Classical Dance

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the AbhinavaBharati. The course introduces various styles of Indian classical dance such as Bharatanatyan, Mohiniyattam, Kuchipudi, Odissi, Katak etc. The course takes the students through both contextual theory as well as practice time.

Indian Martial Arts and Self Defense

The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala's traditional KalariPayattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

Social Awareness Campaign

The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

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18CUL101

Cultural Education I

2 0 0 2

Course outcome:

CO1.get an awareness of Amma’s life and Teachings
CO2. get an unbiased understanding of traditional social structure
CO3. get a message of universal peace and realise the purpose of life
CO4. realise the significance of protecting nature’s sanctity.

Unit 1

Introduction to Indian Culture - Introduction to Amma’s life and Teachings – Symbols of Indian Culture.

Unit 2

Science and Technology in Ancient India - Education in Ancient India - Goals of Life – Purusharthas - Introduction to Vedanta and Bhagavad Gita.

Unit 3

Introduction to Yoga - Nature and Indian Culture - Values from Indian History – Life and work of Great Seers of India.

TEXTBOOKS:

1. *The Glory of India (in-house publication)*
2. *The Mother of Sweet Bliss, (Amma's Life & Teachings)*

18CUL111**Cultural Education II****2002**

CO1.get an awareness of culture, develop respect for traditions, customs & rituals
CO2. get an unbiased understanding of traditional social structure
CO3 get a message of universal peace and realise the purpose of life
CO4. realise the significance of protecting nature's sanctity.

Unit 1

1. Relevance of Sri Rama and Sri Krishna in this Scientific Age
2. Lessons from the Epics of India
3. Ramayana & Mahabharata

Unit 2

4. Who is a Wise Man?
5. A Ruler's Dharma
6. The Story of King Shibi

Unit 3

7. Introduction to the Bhagavad Gita
8. Bhagavad Gita – Action without Desire

Unit 4

9. Role and Position of Women in India
10. The Awakening of Universal Motherhood

Unit 5

11. Patanjali's Astanga - Yoga System for Personality Refinement
12. Examples of Heroism and Patriotism in Modern India

TEXTBOOKS:

- Common Resource Material II (in-house publication)*
Sanatana Dharma - The Eternal Truth (A compilation of Amma's teachings on Indian Culture)

18ENG121**Professional Communication****1022****Objectives:**

To convey and document information in a formal environment; to acquire the skill of self projection in professional circles; to inculcate critical and analytical thinking.

Course outcome:

CO1. develop pattern of communication as required for different professional context
CO2. speak formally paying attention to tone and diction
CO3. develop analytical & argumentative writing; critical and analytical thinking

CO4. acquire reading and listening comprehension with upper intermediate level vocabulary

Unit I

Vocabulary Building: Prefixes and Suffixes; One word substitutes, Modal auxiliaries, Error Analysis: Position of Adverbs, Redundancy, misplaced modifiers, Dangling modifiers – Reported Speech

Unit II

Instruction, Suggestion & Recommendation - Sounds of English: Stress, Intonation
- Essay writing: Analytical and Argumentative

Unit III

Circulars, Memos – Business Letters - e - mails

Unit IV

Reports: Trip report, incident report, event report - Situational Dialogue - Group Discussion

Unit V

Listening and Reading Practice - Book Review

References

1. *Felixa Eskey. Tech Talk, University of Michigan. 2005*
2. *Michael Swan. Practical English Usage, Oxford University Press. 2005*
3. *Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Harcourt, 2003.*
4. *Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.*
5. *Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.*
6. *Lynch, Tony. Study Listening. New Delhi: CUP, 2008.*
7. *Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.*
8. *Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.*
9. *Syamala, V. Effective English Communication For You (Functional Grammar, Oral and Written Communication): Emerald, 2002.*

Course outcome:

CO1. recognise the physical, chemical & biological components of the Earth's systems and how they function
CO2. develop an attitude of preserving and conserving bio-diversity
CO3. understand how local, regional, state, national and international laws and regulations influence environmental decisions
CO4. realise the benefits of eco-friendly products and green initiatives

Unit 1

State of Environment and Unsustainability, Need for Sustainable Development, Traditional conservation systems in India, People in Environment, Need for an attitudinal change and ethics, Need for Environmental Education, Overview of International Treaties and Conventions, Overview of Legal and Regulatory Frameworks.

Environment: Abiotic and biotic factors, Segments of the Environment, Biogeochemical Cycles, Ecosystems (associations, community adaptations, ecological succession, Food webs, Food chain, ecological pyramids), Types of Ecosystems – Terrestrial ecosystems, Ecosystem Services, Economic value of ecosystem services, Threats to ecosystems and conservation strategies.

Biodiversity: Species, Genetic & Ecosystem Diversity, Origin of life and significance of biodiversity, Value of Biodiversity, Biodiversity at Global, National and Local Levels, India as a Mega-Diversity Nation (Hotspots) & Protected Area Network, Community Biodiversity Registers. Threats to Biodiversity, Red Data book, Rare, Endangered and Endemic Species of India. Conservation of Biodiversity. People's action. Impacts, causes, effects, control measures, international, legal and regulatory frameworks of: Climate Change, Ozone depletion, Air pollution, Water pollution, Noise pollution, Soil/ land degradation/ pollution

Unit 2

Linear vs. cyclical resource management systems, need for systems thinking and design of cyclical systems, circular economy, industrial ecology, green technology. Specifically apply these concepts to: Water Resources, Energy Resources, Food Resources, Land & Forests, Waste management.

Discuss the interrelation of environmental issues with social issues such as: Population, Illiteracy, Poverty, Gender equality, Class discrimination, Social impacts of development on the poor and tribal communities, Conservation movements: people's movements and activism, Indigenous knowledge systems and traditions of conservation.

Unit 3

Common goods and public goods, natural capital/ tragedy of commons, Cost benefit analysis of development projects, Environment Impact Assessment (EIA), Environment Management Plan (EMP), Green business, Eco-labeling, Problems and solutions with case studies.

Global and national state of housing and shelter, Urbanization, Effects of unplanned development case studies, Impacts of the building and road construction industry on the environment, Eco-homes/ Green buildings, Sustainable communities, Sustainable Cities.

Ethical issues related to resource consumption, Intergenerational ethics, Need for investigation and resolution of the root cause of unsustainability, Traditional value systems of India, Significance of holistic value-based education for true sustainability.

TEXTBOOKS / REFERENCES:

1. R. Rajagopalan, *Environmental Studies: From Crisis to Cure*. Oxford University Press, 2011, 358 pages. ISBN: 9780198072089.
2. Daniel D. Chiras, *Environmental Science*. Jones & Bartlett Publishers, 01-Feb-2012, 669 pages. ISBN: 9781449645311.
3. Andy Jones, Michel Pimbert and Janice Jiggins, 2011. *Virtuous Circles: Values, Systems, Sustainability*. IIED and IUCN CEESP, London. URL: <http://pubs.iied.org/pdfs/G03177.pdf>
4. Annenberg Learner, *The Habitable Planet*, Annenberg Foundation 2015. URL: <http://www.learner.org/courses/envsci/unit/pdfs/textbook.pdf>.

18HIN101

HINDI I

1 0 2

Course outcome:

CO1. get an awareness about the richness of language
CO2. improve their vocabulary and ability to use language fluently
CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

Unit-1

- a) Introduction to Hindi Language, -other Indian Language's, Official Language, link Language Technical terminology..
- b) Hindi alphabet: Paribhasha Aur Bhed.
- c) Shabda: Paribhasha Aur Bhed, Roopantharki Drishti se
- d) Sangya -Paribhasha Aur Bhed, Sangyake Roopanthar-ling, vachan, karak
- e) Sarvanaam- Paribhasha Aur Bhed.

Unit-2

- a) Common errors and error corrections in Parts of Speech –with emphasis on use of pronouns, Adjective and verb in different tenses –gender & number
- b) Conversations, Interviews, Short speeches.

Unit -3

- a) Letter writing –Paribhasha Aur Bhed, Avedanpatra (request letter) & Practice
- b) Translation-Paribhasha Aur Bhed, English to Hindi

Unit- 4

Peom :

- a) Maithilisharangupt: sakhivemujse kahakarjaate
- b) Suryakanthtripatinirala :Priyatam
- c) Mahadevvarma- adhikaar
- d) Shiyaramsharangupt: ekphoolkichah

Unit- 5

Kahani

- a) Kafan- Premchand ,
- b) Rajasthan ki Ek Gaav ke theerthyatra -Beeshmasahni
- c) Raychandrabhai :By Mahatma Gandhi - Sathyake prayog
- d) Rajani -Mannu Bhandari

18HIN111

HINDI II 1 0 2

Course outcome:

CO1. get an awareness about the richness of language

CO2.improve their vocabulary and ability to use language fluently

CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

Unit -1

a) Visheshan- ParibhashaAurBhed. special usage of adverbs, changing voice and conjunctions in sentences.

b) kriya- ParibhashaAurBhed, rupantharkidrushti se-kaal

c) padhparichay.

d) VigyapanLekhan (Advertisement writing), Saar Lekhan (Precise writing).

Unit -2

Communicative Hindi – MoukhikAbhivyakthi –understanding proper pronunciation, Haptics ...etc in Interviews ,short speeches .

Unit -3

Film review,Audio –Visual-Media in Hindi – Movies appreciation and evaluation.News reading and presentations in Radio and Tv channels in Hindi, samvaadhlekhan,

Unit -4

a) Harishankarparasaiyi- SadacharkaThavis

b) Jayashankarprasadh – Mamata

c) Mannubandari- Akeli

d) Habibtanvir- Karthus

Unit -5

KavyaTarang

a) Himadrithungshrung se (poet- Jayasankarprasad)

b) Dhabba (poet- kedarnath sing) ,

c) Proxy (poet- Venugopal),

d) Machis(poet –Suneeta Jain) ,

e) Vakh. (poet – Arunkamal)

f) Fasal (poet- SarveshwarDayalSaxena)

18KAN101**KANNADA I****1 02**

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To analyse language in context to gain an understanding of vocabulary, spelling, punctuation and speech

Course outcome:

CO1. get an awareness about the richness of language

CO2.improve their vocabulary and ability to use language fluently

CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

UNIT – 1

- Railway Nildanadalli – K. S. NarasimhaSwamy
- Amma, AacharaMattuNaanu – K. S. NisarAhamad
- KeregeHaara – Janapada
- Simhaavalokana – H.S. Shivaprakash

UNIT – 2

- DhanwantriChikitse - Kuvempu
- Mouni - Sethuram
- MeenakshiManeyaMestru - Kuvempu

UNIT – 3

- Sukha –H.G Sannaguddayya
- Mobile Thenkara Jen NonagalaJhenkara – NageshHegade
- NammaYemmegeMaatuTiliyitu – GoruruRamaswamylyangar

UNIT – 4

Language structure

- Usage of punctuation marks
- Introduction to words (right usage)
- Reading skills
- Sentence formation (simple & complex)
- Translation- English to Kannada

References:

1. Kannada SamskrutiKosha – Dr. Chi. C Linganna
2. Kannada SannaKathegalu – G H Nayak
3. Lekhana Kale – N. PrahladRao
4. Kannada SahithyaCharithre – R. Sri Mugali

18KAN111

KANNADA II

1 0 2

Objectives:

- To enable the students to acquire basic skills in functional language.
- To develop independent reading skills and reading for appreciating literary works.
- To develop functional and creative skills in language.
- To enable the students to plan, draft, edit & present a piece of writing.

Course outcome:

CO1. get an awareness about the richness of language

CO2.improve their vocabulary and ability to use language fluently

CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

UNIT – 1

- BettadaMelonduManeyaMaadi – AkkaMahadevi
- ThallanisadiruKandya – Kanakadasa
- Avva – P. Lankesh
- Neevallave – K. S. NarasimhaSwamy

UNIT – 2

Gunamukha – Drama by P. Lankesh

UNIT – 3

Karvalo – Novel by PoornachandraThejaswi

UNIT – 4

Letter Writing –

Personal (congratulation, invitation, condolence etc.)

- Official (To Principal, Officials of various departments, etc.,)
- Report writing
- Essay writing
- Precise writing

Prescribed text:

1. Gunamukha by P. Lankesh (LankeshPrakashana)
2. Karvalo by PoornachandraThejaswi (Mehtha publishing house)

Reference

1. SaamanyanigeSahithyaCharitre (chapter 1 to 10) – Bangalore University Publication
2. Hosa Kannada SaahithyaCharithre – L.S SheshagiriRao
3. KacheriKaipidi – Kannada AdhyayanaSamsthe (Mysuru University)
4. Kannada SahithyaCharithre – R. Sri Mugali
5. H.S.Krishna Swami Iyengar – *Adalitha Kannada – Chetana Publication, Mysuru*

18MAL101

Malayalam I

Course outcome:

CO1. get an awareness about the richness of language

CO2.improve their vocabulary and ability to use language fluently

CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

Unit 1

Ancient poet trio: *Adhyatmaramayanam, LakshmanaSwanthanam (Lines: valsasoumitre... mungikidakayal)*, Ezhuthachan -Medieval period classics – *Jnanappana(Lines:201 to 298)*, Poonthanam.

Unit 2

Modern Poet trio: *EnteGurunathan*, VallatholNarayanaMenon- Critical analysis of the poem.

Unit 3

Short stories from period 1/2/3:*Poovanpazham*-VaikaomMuhammedBasheer-Literary & Cultural figures of Kerala and about their literary contributions.

Unit 4

Literary Criticism: *BharathaParyadanam*-*VyasanteChiri*-Ithihasa studies-KuttikrishnaMararu-Outline of literary Criticism in Malayalam Literature-Introduction to KuttikrishnaMararu& his outlook towards literature &life.

Unit 5

Error-freeMalayalam: **1.**Language; **2.**Clarity of expression; **3.**Punctuation-Thettillatha Malayalam – Writing-**a.** Expansion of ideas; **b.**PrecisWriting; **c.** Essay Writing; **d.**Letter writing; **e.**RadioSpeech;**f.**Script/Feature/Script Writing;**g.**NewsEditing;**h.**Advertising;**i.**Editing;**j.**EditorialWriting;**k.**Critical appreciation of literary works (Any one or two as an assignment).

18MAL111

Malayalam II

Course outcome:

CO1. get an awareness about the richness of language
CO2.improve their vocabulary and ability to use language fluently
CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

Unit1

Ancient poet trio: *Kalayanasougandhikam*,(*Lines: kallummarangalum... namukkennarikavrikodara*),KunjanNambiar - Critical analysis of his poetry-Ancient Drama: *Kerala Sakunthalam* (Act 1), Kalidasan (Transilated by Attor Krishna Pisharody).

Unit 2

Modern/romantic/contemporary poetry: *Chandanakkattil* –G.Sankarakurupu-Romanticism – modernism.

Unit 3

Memoirs from Modern Poets: *Theppathi*, BalachandranChullikkadu-literary contributions of his time.

Unit 4

Partof an autobiography/travelogue: *KannerumKinavum*, Chapter: ValarnnuVarunnoratmavu, V.T.Bhattathirippadu-Socio-cultural literature-historical importance.

Unit 5

Error-free Malayalam-**1.**Language; **2.**Clarity of expression; **3.**Punctuation-Thettillatha Malayalam-Writing-**a.**Expansion of ideas;**b.**PrécisWriting;**c.** Essay Writing; **d.**Letter writing;**e.**RadioSpeech;**f.**Script/Feature/ScriptWriting;**g.**NewsEditing;**h.**Advertising;**i.**Editing; **j.**EditorialWriting;**k.**Critical appreciation of literary works (Any one or two as an assignment).

18SAN101

SANSKRIT I

1 0 2

To familiarize students with Sanskrit language and literature.
To read and understand Sanskrit verses and sentences.
Self-study of Sanskrit texts and to practice communication in Sanskrit.
To help the students imbibe values of life and Indian traditions propounded by the scriptures.
To be able to speak in Sanskrit.

Course outcome:

CO1. get an awareness about the richness of language
CO2.improve their vocabulary and ability to use language fluently
CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

Semester I

Module I

Introduction to Sanskrit language, Devanagari script - Vowels and consonants, pronunciation, classification of consonants, conjunct consonants, words – nouns and verbs, cases – introduction, numbers, Pronouns, communicating time in Sanskrit. Practical classes in spoken Sanskrit. (7 hours)

Module II

Verbs- Singular, Dual and plural — First person, Second person, Third person.
Tenses – Past, Present and future – Atmanepadi and parasmaipadi-karthariprayoga. (8hrs)

Module III

Words for communication and moral stories. (4 hrs)

Module IV

ChanakyaNeethi first chapter (first 15 Shlokas) (6 hrs)

Module V

Translation of simple sentences from Sanskrit to English and vice versa.(5hs)

18SAN111

SANSKRIT II

1 0 2

Course outcome:

CO1. get an awareness about the richness of language
CO2.improve their vocabulary and ability to use language fluently
CO3. gain an awareness about the values which are enshrined in the epics and its inherent literature.

Module I

Seven cases, Avyayas, sentence making with Avyayas, Sapthakakaras. (5hrs)

Module II

Kthavathu' Prathyayam, Upasargas, Kthvatha,Thumunnantha, LyabanthaPrathyayam. Three Lakaras – brief introduction, Lot lakara

(5hrs)

Module III

New words and sentences for the communication, Slokas, moral stories(panchathantra) Subhashithas, riddles (Selected from the Pravesha Book)

(5hrs)

Module IV

Introduction to classical literature, classification of Kavyas, classification of Dramas - Important five Mahakavyas

(5hrs)

Module V

Translation of paragraphs from Sanskrit to English and wise -verse (5hrs)

Module VI

Bhagavad - Geeta fourteenth chapter (all 27 Shlokas) (5hrs)

Essential Reading:

- 1, Pravesaha; Publisher :Samskritabharati, Aksharam, 8th cross, 2nd phase, girinagar, Bangalore -560 085
- 2, Sanskrit Reader I, II and III, R.S. Vadhyar and Sons, Kalpathi, Palakkad
- 3, PrakriyaBhashyamwritten and published by Fr. John Kunnappally
- 4, Sanskrit Primer by Edward Delavan Perry, published by Ginn and Company Boston
- 5, Sabdamanjari, R.S. Vadyar and Sons, Kalpathi, Palakkad
- 6, Namalinganusasanam by Amarasimha published by Travancore Sanskrit series
- 7, SubhashitaRatnaBhandakara by Kashinath Sharma, published by Nirnayasagarpress

18SSK201

LIFE SKILLS I

1 0 2 2

OBJECTIVE:

To build soft skills and an awareness for its importance

Course outcome:

CO1. make a smooth transition from an academic environment to work environment and adopt well
CO2. learn to cope with fear, stress and competition in professional world
CO3. develop positive attitude, self-motivating ability and willingness for continuous knowledge upgradation

Soft skills and its importance: Pleasure and pains of transition from an academic environment to work-environment. Need for change. Fears, stress and competition in the professional world.Importance of positive attitude, self-motivation and continuous knowledge up gradation.

Self Confidence: Characteristics of the person perceived, characteristics of the situation, Characteristics of the Perceiver. Attitude, Values, Motivation, Emotion Management, Steps to like yourself, Positive Mental Attitude, Assertiveness.

Presentations: Preparations, Outlining, Hints for efficient practice, Last minute tasks, means of effective presentation, language, Gestures, Posture, Facial expressions, Professional attire.

Vocabulary building: A brief introduction into the methods and practices of learning vocabulary. Learning how to face questions on antonyms, synonyms, spelling error, analogy etc. Faulty comparison, wrong form of words and confused words like understanding the nuances of spelling changes and wrong use of words.

Listening Skills: The importance of listening in communication and how to listen actively.

Prepositions and Articles: A experiential method of learning the uses of articles and prepositions in sentences is provided.

Problem solving; Number System; LCM &HCF; Divisibility Test; Surds and Indices; Logarithms; Ratio, Proportions and Variations; Partnership; Time speed and distance; work time problems;

Data Interpretation: Numerical Data Tables; Line Graphs; Bar Charts and Pie charts; Caselet Forms; Mix Diagrams; Geometrical Diagrams and other forms of Data Representation.

Logical Reasoning: Family Tree; Linear Arrangements; Circular and Complex Arrangement; Conditionalities and Grouping; Sequencing and Scheduling; Selections; Networks; Codes; Cubes; Venn Diagram in Logical Reasoning.

TEXTBOOKS:

1. *A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.*
2. *Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.*
3. *Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.*
4. *The Hard Truth about Soft Skills, by Amazone Publication.*

REFERENCES:

1. *Quantitative Aptitude, by R S Aggarwal, S Chand Publ.*
2. *Verbal and Non-verbal Reasoning, R S Aggarwal, S Chand Publ.*
3. *Data Interpretation, R S Aggarwal, S Chand Publ.*
4. *Nova GRE, KAPAL GRE, Barrons GRE books;*
5. *Quantitative Aptitude, The Institute of Chartered Accountants of India.*
6. *More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.*
7. *The BBC and British Council online resources*
8. *Owl Purdue University online teaching resources*
9. *www.thegrammarbook.com online teaching resources*
10. *www.englishpage.com online teaching resources and other useful websites.*

18SSK211

LIFE SKILLS II

1 0 2 2

Objective:

To groom the student for professional environment and making him aware of the corporate culture and basic business etiquette

Course outcome:

CO1. acquire a knowledge of socially acceptable ways of behaviour, corporate etiquette; develop cultural adoptability

CO2. exhibit appropriate body language; being aware of personal hygiene, proper dressing and grooming

CO3. convert Passive vocabulary into active vocabulary; learn the etymology of words
CO4. solve problems in QA & logical reasoning and interpret and analyse the data

Professional Grooming and Practices: Basics of Corporate culture, Key pillars of Business Etiquette. Basics of Etiquette: Etiquette – Socially acceptable ways of behaviour, Personal hygiene, Professional attire, Cultural Adaptability. Introductions and Greetings: Rules of the handshake, Earning respect, Business manners. Telephone Etiquette: activities during the conversation, Conclude the call, To take a message. Body Language: Components, Undesirable body language, Desirable body language. Adapting to Corporate life: Dealing with people.

Group Discussions: Advantages of Group Discussions, Structured GD – Roles, Negative roles to be avoided, Personality traits to do well in a GD, Initiation techniques, How to perform in a group discussion, Summarization techniques.

Listening Comprehension advanced: Exercise on improving listening skills, Grammar basics: Topics like clauses, punctuation, capitalization, number agreement, pronouns, tenses etc.

Reading Comprehension advanced: A course on how to approach middle level reading comprehension passages.

Problem solving – Money Related problems; Mixtures; Symbol Based problems; Clocks and Calendars; Simple, Linear, Quadratic and Polynomial Equations; Special Equations; Inequalities; Functions and Graphs; Sequence and Series; Set Theory; Permutations and Combinations; Probability; Statistics.

Data Sufficiency: Concepts and Problem Solving.

Non-Verbal Reasoning and Simple Engineering Aptitude: Mirror Image; Water Image; Paper Folding; Paper Cutting; Grouping Of Figures; Figure Formation and Analysis; Completion of Incomplete Pattern; Figure Matrix; Miscellaneous.

Special Aptitude: Cloth, Leather, 2D and 3D Objects, Coin, Match Sticks, Stubs, Chalk, Chess Board, Land and geodesic problems etc., Related Problems

TEXTBOOKS:

1. *A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.*
2. *Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.*
3. *Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa & Co.*
4. *The Hard Truth about Soft Skills, by Amazone Publication.*

REFERENCES:

1. *Quantitative Aptitude, by R S Aggarwal, S Chand Publ.*
2. *Verbal and Non-verbal Reasoning, R S Aggarwal, S Chand Publ.*
3. *Quantitative Aptitude by AbjithGuha, Tata McGraw hill Publ.*
4. *More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.*
5. *The BBC and British Council online resources*
6. *Owl Purdue University online teaching resources*
7. *www.thegrammarbook.com online teaching resources*
8. *www.englishpage.com online teaching resources and other useful websites.*

18SSK301

LIFE SKILLS III

1 0 2 2

Objective:

To groom the student for professional environment and making him aware of the corporate culture and basic business etiquette

Course outcome:

CO1. work in teams; learn team playing and develop leadership skills
CO2. to gain knowledge of group dynamism
CO3. learn how to face an interview and strategies of test taking
CO4. learn the skills of Lateral thinking for problem solving

Team Work: Value of Team work in organisations, Definition of a Team, Why Team, Elements of leadership, Disadvantages of a team, Stages of Team formation. Group Development Activities: Orientation, Internal Problem Solving, Growth and Productivity, Evaluation and Control. Effective Team Building: Basics of Team Building, Teamwork Parameters, Roles, Empowerment, Communication, Effective Team working, Team Effectiveness Criteria, Common characteristics of Effective Teams, Factors affecting Team Effectiveness, Personal characteristics of members, Team Structure, Team Process, Team Outcomes.

Facing an Interview: Foundation in core subject, Industry Orientation/ Knowledge about the company, Professional Personality, Communication Skills, activities before interview, upon entering interview room, during the interview and at the end. Mock interviews.

Advanced Grammar: Topics like parallel construction, dangling modifiers, active and passive voices, etc.

Syllogisms, Critical reasoning: A course on verbal reasoning. Listening Comprehension advanced: An exercise on improving listening skills.

Reading Comprehension advanced: A course on how to approach advanced level of reading, comprehension passages. Exercises on competitive exam questions.

Specific Training: Solving campus recruitment papers, National level and state level competitive examination papers; Speed mathematics; Tackling aptitude problems asked in interview; Techniques to remember (In Mathematics). Lateral Thinking problems. Quick checking of answers techniques; Techniques on elimination of options, Estimating and predicting correct answer; Time management in aptitude tests; Test taking strategies.

TEXTBOOKS:

1. *A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.*
2. *Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.*
3. *Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.*
4. *The Hard Truth about Soft Skills, by Amazon Publication.*

REFERENCES:

1. *Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;*
2. *The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;*
3. *Vedic Mathematics, by Jagadguru Swami Sri BharatiKrsnaTirthayi Maharaja, MotilalBanarsidass Publ.;*
4. *How to Ace the Brainteaser Interview, by John Kador, McGraw Hill Publishers.*

5. *Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;*
6. *Quicker Maths, by M tyra & K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;*
7. *More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.*
8. *The BBC and British Council online resources*
9. *Owl Purdue University online teaching resources*
10. www.thegrammarbook.com online teaching resources
11. www.englishpage.com online teaching resources and other useful websites.

18ENG101

Communicative English

2-0-2-3

Objectives:

To help students obtain an ability to communicate fluently in English; to enable and enhance the students skills in reading, writing, listening and speaking; to impart an aesthetic sense and enhance creativity

Course outcome:

CO1. Acquire working knowledge of grammar and syntax; upper intermediate level of vocabulary
CO2. Attain expertise in writing descriptive and narrative prose
CO3. Read and comprehend prose and poetry
CO4. Gain familiarity with current affairs and news awareness
CO5. Speak clearly and fluently on a given topic

Unit I

Kinds of sentences, usage of preposition, use of adjectives, adverbs for description, Tenses, Determiners- Agreement (Subject – Verb, Pronoun- Antecedent) collocation, Phrasal Verbs, Modifiers, Linkers/ Discourse Markers, Question Tags

Unit II

Paragraph writing – Cohesion - Development: definition, comparison, classification, contrast, cause and effect - Essay writing: Descriptive and Narrative

Unit III

Letter Writing - Personal (congratulation, invitation, felicitation, gratitude, condolence etc.) Official (Principal / Head of the department/ College authorities, Bank Manager, Editors of newspapers and magazines)

Unit IV

Reading Comprehension – Skimming and scanning- inference and deduction – Reading different kinds of material –Speaking: Narration of incidents / stories/ anecdotes- Current News Awareness

Unit V

Prose: John Halt’s ‘Three Kinds of Discipline’ [**Detailed**]

Max Beerbohm’s ‘The Golden Drugget’ [**Detailed**]

Poems: Ogden Nash- ‘This is Going to Hurt Just a Little Bit’ [**Detailed**]

Robert Kroetsch– ‘I am Getting Old Now’, Langston Hughes– ‘I, Too’ [**Detailed**]

Wole Soyinka- ‘Telephone Conversation’ [**Non-Detailed**]

Kamala Das- 'The Dance of the Eunuchs' [Non-Detailed]

Short Stories: Edgar Allan Poe's 'The Black Cat', Ruskin Bond's 'The Time Stops at Shamili' [Non-Detailed]

CORE READING:

1. Ruskin Bond, *Time Stops at Shamli and Other Stories*, Penguin Books India Pvt Ltd, 1989
2. Syamala, V. *Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006*
3. Beerbohm, Max, *The Prince of Minor Writers: The Selected Essays of Max Beerbohm (NYRB Classics)*, Phillip Lopate (Introduction, Editor), The New York Review of Book Publishers.
4. *Edger Allan Poe. The Selected Works of Edger Allan Poe. A Running Press, 2014.*
5. Online sources

References:

1. Ruskin Bond, *Time Stops at Shamli and Other Stories*, Penguin Books India Pvt Ltd, 1989
2. Martinet, Thomson, *A Practical English Grammar*, IV Ed. OUP, 1986.
3. Murphy, Raymond, *Murphy's English Grammar*, CUP, 2004
4. Online sources

18PHY103

MECHANICS

3- 0- 2 4

Objectives: To enable studentstounderstand Newtonian mechanics and apply Newton's laws to explain natural physical phenomena.

Course Outcome:

CO1	Helps the student to understand the Relative motion. Inertial and non-inertial reference frames.
CO2	Enables the student to understand the parameters defining the motion of mechanical systems and their degrees of freedom & Study of the interaction of forces between solids in mechanical systems.
CO3	Helps the student to understand the center of mass and inertia tensor of mechanical systems. 5 Application of the vector theorems of mechanics and interpretation of their results. 6 Newton's laws of motion and conservation principles

Unit I:

Vector Analysis: Integrals (line, surface and volume), Physical significance of Gradient, Divergence and curl, statement of Gauss's and Stroke's theorems.

Particle dynamics: Review of the equations of motion, projectile motion, Newton's First, Second and Third Law of Motion, Newton's I Law as a basic kinematical law defining a frame of reference, Newton's II Law as a basic dynamical law of mechanics and Newton's III law as an interaction law, Frames of reference, inertial and non-inertial, pseudo forces, Force laws, weight and mass, Application of Newton's law, importance of free body diagrams representing forces on the body in a free body diagram and frictional forces. Discussion of importance of friction in daily life.

Unit II:

Work and Energy: Work done by a constant force and by a variable force – one and two dimensional cases. Kinetic energy and work-energy theorem, Significance of the work-energy theorem, power. The importance of language in Physics to be highlighted by differentiating the meaning of ‘work’, ‘power’, ‘energy’ as defined in Physics and in daily life.

Conservation Laws: Introduction, conservative forces, potential energy, complete solution for one, two and three dimensional systems, non-conservative forces, conservation of energy, conservation of energy to be seen as a spreading out and appearing in different forms, mass and energy.

Conservation of Linear Momentum: Centre of mass, motion of the center of mass, linear momentum of a particle, linear momentum of a system of particles, conservation of linear momentum, some applications of momentum principle, systems of variable mass – Rocket equation.

Collisions: Elastic and Inelastic, Collision in one and two dimensions.

Unit III:

Gravitation: Historical Introduction, Newton’s law of Universal Gravitation, Universal Gravitation constant ‘G’, inertial and gravitational mass, variation in acceleration due to gravity with altitude and depth, motion of planets and satellites, gravitational field and potential, gravitational potential energy, potential energy for many particle systems, calculations of field and potential for (a) a spherical shell, (b) a sphere, energy consideration in the motion of planets and satellites.

Central Force: Kepler’s laws of planetary motion, the inverse square law, Rutherford’s problem, derivation of Kepler’s Law from Universal law of Gravitation.

Unit IV:

Rotational Kinematics

Rotational variables, angular velocity, angular acceleration. Rotation with constant angular acceleration, Linear and angular variables, kinetic energy of rotation, rotational inertia, calculation of rotational inertia – of a rod, sphere and cylinder, torque, Newton’s laws of rotation, work, power and work – kinetic energy theorem.

Unit V:

Dynamics of Rigid bodies

Angular momentum and moment of inertia, Theorem on moment of inertia, moment of inertia for (i) solid cylinder, (ii) rectangular slab, (iii) solid sphere and (iv) circular hoop.

Fluid Mechanism

Ideal fluids, Equation of Continuity, Viscous fluids, critical velocity, Derivation of Poiseuille’s Equation.

PRACTICALS

(A minimum of ten experiments to be done from the list given below)

1. To Determine the Momentum of Inertia and Mass of a Flywheel.
2. Study of the motion of an air bubble.
3. Study of the motion of a freely falling body
4. Study of the acceleration of a body subjected to different unbalanced forces
5. Study of accelerations of different masses under a constant unbalanced force.
6. Study of conservation of energy and momentum in head-on-collision between two spheres of equal mass.
7. Conservation of momentum in an explosion
8. Determination of Surface tension of liquid by capillary rise method.
9. To study the relation between length and time period of a simple pendulum
10. Study of the rate of flow of water through a capillary tube under different pressure heads
11. Momentum of inertia of a rod by torsional oscillation.
12. Determination of Acceleration due to Gravity and radius of gyration by Bar Pendulum

Text books:

1. J C Upadhyaya, "*Classical Mechanics*", Himalaya Publishing house, Reprint-**2013**.
2. D S Mathur, "*Mechanics*", S Chand and company, New Delhi, Reprint-**2001**.
3. BrijLal, N Subrahmanyam, "*Properties of matter*", 6th edition, Eurasia publishing house Ltd. New Delhi, Reprint-**1993**.

References:

1. Halliday, Resnick, Jearl Walker, "*Principles of Physics*" 9th edition, Wiley, **2013**.
2. Berkeley Physics Course, Vol-1 "*Mechanics*", 2nd edition, Charles Kittle, Walter D Knight, Malvin A Ruderman, Carl A Helmholtz, Burton J Moyer, Tata McGraw Hill Education Private Limited, New Delhi, (SIE)-**2011**.
3. D S Mathur, "*Elements of properties of matter*", S Chand and company, New Delhi, Reprint-**2007**.

18MAT101

CALCULUS

3-1-0 4

Objective: To enable students to understand the meaning of differentiation and integration and apply the techniques of indefinite and definite integration.

Course Outcome:

CO1	Students will be able to productively discuss mathematics in a group setting.
CO2	Students will be able to identify areas in mathematics and other fields where Calculus is useful.
CO3	Students will be able to generate solutions to unfamiliar problems.

Unit I:

Limits and Continuity: Rates of Change and Limits – Calculating Limits using Limiting Laws – The Precise definition of Limit – One-Sided Limits and Limits at Infinity – Continuity – Tangents and Derivatives.

Chapter-2 (Sections 2.3-2.7)

Unit II:

Differentiation: The Derivative as a Function – Differentiation Rules – The Derivative as a Rate of Change – Derivatives of Trigonometric Functions – The Chain Rule and Parametric Equations – Implicit Differentiation - n^{th} derivatives of the functions: e^{ax} , $(ax + b)^n$, $\log(ax + b)$, $\sin(ax + b)$, $\cos(ax + b)$, $e^{ax}\sin(bx + c)$, $e^{ax}\cos(bx + c)$ – Problems.

Chapter-3 (Sections 3.1-3.6)

Unit III:

Application of Derivatives: Extreme values of Functions – The Mean Value Theorem – Monotonic Functions and the First Derivative Test – Concavity and Curve Sketching.

Chapter-4 (Sections 4.1-4.4)

Unit IV:

Integration: Estimating with Finite Sums – Sigma Notation and Limits of Finite Sums – The Definite Integral – The Fundamental Theorem of Calculus – Indefinite Integrals and the Substitution Rule – Substitution and Area between Curves.

Chapter-5 (Sections 5.1-5.6)

Unit V:

Techniques of Integration: Basic Integration Formulas – Integration by Parts – Integration of Rational Functions by Partial Fractions – Trigonometric Integrals – Trigonometric Substitutions– Improper Integrals.

Chapter-8 (Sections 8.1-8.4, 8.8)

Text books:

1. Calculus by Finney and Thomas, Pearson, Eleventh Edition, 11th Edition, Pearson, 2009.

References:

1. M. J. Strauss, G. L. Bradley and K. J. Smith, *Calculus*, 3rd Edition, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 2007.
2. S BalachandraRao, *Differential Calculus*, New Age Publications, 2005

18CSA104 COMPUTER FUNDAMENTALS AND C PROGRAMMING 3-0-2 4

Objectives: To enable students to keep pace with the changes in the IT and to describe the main principles of procedure oriented programming, the central formalisms used in the description of programming languages.

Course Outcome:

CO1	The students should be able to understand functional hierarchical code organisation.
CO2	The students should be able to define and manage data structures based on problem subject domains.

Unit I:

Introduction to computer systems: Importance of computers, Types of computers. What computers can do, what computers can't do, Characteristics of computers. **Classification of computers:** Microcomputer, Minicomputer, Mainframe computers, Super computers. **Components of computers:** CPU, ALU, Control Unit, Memory-Registers & Addresses. **Types of memory:** Primary memory – RAM, ROM, EPROM, EEPROM, Static and Dynamic RAM, Secondary memory. How the CPU and Memory works.

Unit II:

Input Devices & Output Devices: Introduction, functions, different types of input devices- Key board, Mouse, Track ball, joystick, scanners, Touch screen, and Light pen. Output Devices- Monitors, Printers, Plotters, Sound Cards & Speakers. **Operating System:** Introduction, Functions of OS-job management, Batch processing, On-line processing, Data management, I/O management. **Classifications of OS:** multi user, Multiprocessing, multitasking, multithreading, real-time.

Unit III:

Word processors: Notepad, Microsoft office word, **Spread sheets, presentation graphics.**
Introduction to Internet and World Wide Web: Internet basics, internet protocols, internet addressing, web browsers, searching the web, internet chat, email, internet, E-commerce.

Unit IV:

Introduction to programming: Problem solving techniques, Algorithms, Flowcharts.
Introduction to C language: History and features, C as structured language, C as middle level language, Structure of C program, applications, advantages, preprocessor directives, Execution phases C conventions, character set, declaration of variables, escape sequences, operators, types, operator precedence, type conversions, mathematical library functions, input output operations.

Unit V:

Decision making and looping statements, Arrays – Single dimensional arrays, Two- dimensional arrays: declaration, initialization, accessing elements of array and memory representation.
Strings: defining strings, initializing, accessing, arithmetic operations on characters, character by character input and output, string handling functions.

Text books:

1. "Fundamentals of Information Technology" , Alexis Leon and Mathew Leon, Leon TECHWorld.

2. "Let us C", YashwanthKanetkar, 13th Edition, BPB publications.
3. "Programming in ANSI C", E Balaguruswamy, Sixth Edition, Tata McGraw-Hill Publishing Company limited.

References:

1. "Information technology- the Breaking wave", Dennis P Curtin, Kim Foley, Cathleen Morin Tata McGraw-Hill Publishing Company limited.
2. "Test Your C Skills", YashwanthKanetkar.
3. "Exploring C", YashwanthKanetkar.

18PHY112

WAVES, HEAT AND THERMODYNAMICS

3- 0 -2 4

Objectives: To enable students to see relation between linear and rotational motion and understand the production and propagations of waves in elastic media. And also understand the laws of thermodynamics and its applications.

Course Outcome:

CO1	The students will be able to understand the concepts of mechanics, acoustics and the properties of matter.
CO2	The students will be able to understand physical characteristics of SHM and obtaining solution of the oscillator using differential equations
CO3	The students will be able to understand the interrelationship between thermodynamic functions and ability to use such relationships to solve practical problems.

Unit I:

Oscillations : Simple Harmonic Motion (SHM), the restoring force along with its kinematical model, force law, SHM equation and idea of phase and phase difference, energy considerations in simple harmonic motion. Superposition of the SHMs, Lissajous figures, Equation for damped vibrations, forced vibrations. Analysis of complex waves. Fourier series, Application to square wave, triangular wave.

Waves in elastic media: Review of Mechanical waves, types of waves, travelling waves, the superposition principle, wave speed, power and intensity in wave motion, expression for transverse waves in a stretched string, interference of waves, standing waves, resonance, simulation and demonstrations using ripple tank.

Sound Waves: Audible, ultrasonic and infrasonic waves, propagation and speed of longitudinal waves, travelling longitudinal waves, standing longitudinal waves, vibrating systems and source of sound, beats and Doppler effect, wave equation for sound pressure, sound power and its measuring unit (decibel).

Unit II:

Kinetic Theory of Gases: Introduction, Kinetic Theory of Gases, kinetic theory as particle model and usefulness of the model in explaining the regular structure of crystals (Review), an ideal gas – a macroscopic description, an ideal gas – a microscopic description, kinetic calculation of pressure, kinetic interpretation of temperature, ideal gas scale, intermolecular forces, specific heat of an ideal gas, law of equipartition of energy.

Mean free path, van der Waal's equations of State, critical constants, application to liquefaction of gases.

Unit III:

Heat and First Law of Thermodynamics: Thermal equilibrium, Zeroth law of thermodynamics, ideal gas temperature scale, heat as a form of energy, quantity of heat and specific heat, molar heat capacities of solids, the mechanical equivalent of heat, heat and work; First law of thermodynamics, Discussion on usefulness of First Law of Thermodynamics in Meteorology, some special cases of the first law of thermodynamics – (i) adiabatic process, (ii) isothermal process, (iii) isochoric process, (iv) cyclic process, (v) free expansion.

Unit IV:

Entropy and Second Law of Thermodynamics: Introduction, reversible and irreversible processes, the Carnot cycle, Carnot engine, Carnot theorem, absolute scale of temperature, second law of thermodynamics, efficiency of engines, the thermodynamic temperature scale, entropy in reversible and irreversible processes, entropy and the II law, entropy and disorder, consequences of II and III law of thermodynamics, Second law of thermodynamics as a probabilistic statement.

Low temperature Physics – Porous Plug experiment, temperature of inversion, principle of regenerative cooling, liquefaction of air by Linde's method.

Unit V:

Thermodynamic potentials: Internal Energy, Enthalpy, Helmholtz function, Gibbs function, relations among these functions, Gibbs-Helmholtz equations

Maxwell's Thermodynamic Relations: Derivation of Maxwell's thermodynamic relations, TdS equations, Internal energy equations, Heat capacity equations. Change of temperature during adiabatic process using Maxwell's relations

PRACTICALS

(A minimum of ten experiments to be done from the list given below)

1. Study of the oscillations of a column of water as a function of its length and study of damped oscillation
2. To determine the velocity of sound at 0°C and the end correction by setting up a resonance column (first resonance length)

3. Study of torsional oscillations of a loaded wire and determination of the rigidity modulus of the material of the wire
4. Verification of Stefan's Boltzmann law using Potentiometer
5. Study of Newton's law of cooling.
6. Determination of Thermal conductivity of a bad conductor by Lee Charlton method
7. Specific heat of a solid by the method of mixtures
8. Determination of latent heat of fusion of ice by calorimetric method
9. J by Joules Calorimeter
10. Study of transverse vibrations on a sonometer. To determine the frequency by (i) absolute method, (ii) Comparison method
11. Melde's experiment – determination of frequency
12. Frequency of AC by a sonometer.

Text books:

1. Halliday and Resnick: Fundamentals of Physics, 9th edition, Wiley India, 2011.
2. Brijlal ,N. Subramanyam P.S. Hemne: Heat Thermodynamics and Statistical Physics, 1st Edition. S Chand Publishing, 2007.
3. . S C Gupta: Thermodynamics, 1st edition, Pearson, 2005.

References:

1. R. H. Dittaman and M. W. Zemansky: Heat and Thermodynamics, 7th edition, The McGraw-Hill companies, 2007.
2. S. J. Blundell and K. M. Blundell: Concepts in Thermal Physics, 2nd edition, Oxford University Press, 2006.

18MAT118

MATRICES AND VECTOR CALCULUS

3 -1 -0 4

Objectives: To enable students to understand the basic concepts of matrix calculus, vectors and basic vector operations and solve computational problems of vector calculus

Course Outcome:

CO1	Students will be able to use computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality and diagonalization. (Computational and Algebraic Skills).
CO2	The students will be able to students will be able to use visualization, spatial reasoning, as well as geometric properties and strategies to model, solve problems, and view solutions, as well as conceptually extend these results to higher dimensions. (Geometric Skills).

Unit I:

Systems of Linear Equations: Linear System of Equations, Gauss Elimination, Consistency of a linear system of equations, Vectors, Linear independence and dependence of vectors, Rank of a Matrix.

Text Book-1: Chapter-1 and 2

Unit II:

Eigen value problems: Eigen values, Eigen vectors, Properties of Eigen values and Eigen vectors, Cayley-Hamilton theorem, Some Applications of Eigen value Problems, Similarity of Matrices, Diagonalization of a matrix, Power of a matrix, Diagonalization by orthogonal transformation, Quadratic forms, Canonical form of a quadratic form, Nature of quadratic forms.

Text Book-1: Chapter-7.

Unit III:

Three dimensional coordinate systems, vectors, dot and cross products. Vector Differentiation: Gradient, divergence and curl, identities, invariant scalar.

Text Book-2: Chapter-12 (Sections 12.1-12.5)

Unit IV:

Line integrals, Vector Fields, Work, Circulation and Flux, Path Independence, Potential Functions, and Conservative Fields, Green's Theorem in the plane.

Text Book-2: Chapter-16 (Sections 16.1-16.4)

Unit V:

Surface area and surface integrals, Parameterized surfaces, Stokes Theorem, The divergence Theorem and a unified theory

Text Book-2: Chapter-16 (Sections 16.5-16.8)

Text books:

1. 'Elementary Linear Algebra', Howard Anton and Chris Rorris, John Wiley & Sons, 1994, Seventh Edition.
2. Maurice D Weir, Joel Hass, Frank R Giordano, Thomas' Calculus, 11th Edition, Pearson, 2009.

References:

Murray R Spiegel, Theory and problems of vector analysis, Schism's outline series, McGraw-Hill Book Company 1974.

❖ **Computer Science Paper II**

18CSA115 BASICS OF COMPUTER NETWORKS & WEB TECHNOLOGY 3- 0-2 4

Objective: The purpose of this course is to understand the basics of networking technologies and to design own web pages and also establish adequate formatting and styles.

Course Outcome:

CO1	The students should be able to understand explain the functions of application layer and presentation layer paradigms and protocols.
CO2	The students should be able to classify the routing protocols and analyse how to assign the IP address for the given networks.

Unit I:

Evolution of Computer Networking, Types of Connection- point-to-point, multipoint, Types of Network-LAN, WAN, MAN, Networks topologies-star, mesh, bus, ring, Connection oriented and Connection less Services, Network Devices-Hub, router, switch, gateway, bridge, The OSI reference model, TCP/IP Reference Model.

Unit II:

Introduction to Internet, history of internet, Hardware and software requirements of internet: Host, terminal, modem, ISP, web browser, websites, social networking sites, blogs, search engines.

Unit III:

Introduction to HTML, basic HTML elements, formatting tags- bold, italic, size, underline, deleted, emphasize. Color: color names, color values, marquee, paragraph, link tags, image tag, list – ordered list, unordered list, definition list, Superscript, Subscript. Case study: Design a simple web page by using above tags.

HTML table – row span, column span, body color, border, cell spacing, cell padding, align, caption. Multimedia elements- Inserting Audio files, inserting Video files, screen control attributes. Frames and frameset attribute. Case study: Design a simple web page by using above tags.

Unit IV:

Introduction to Forms, Get and Post methods, Text Input Controls: text, password, email, url, number, range, date, month, time, week. Label, Checkboxes Controls, Radio Box Controls, Select Box Controls, Text area, File Select boxes, Buttons, Submit and Reset Button, text field tag, File Upload, required attribute. Case study: Design a form by using form and table elements and perform validation.

Unit V:

Introduction to CSS, Types of style sheets, Applying styles to specific groups of elements – class selector, id selector, CSS background, CSS text, CSS fonts, color, image, CSS box model.

Text books:

1. Harley Hahn - Internet Complete Reference - Second Edition – TMH
2. The Complete reference HTML Second edition-Powell, Tata McGraw-Hill

18LAW201

INDIAN CONSTITUTION

2 0 0 2

Objective: *The preliminary objective is to ensure that every student has some knowledge about Indian Constitution.*

Course outcome:

CO1. develop awareness on fundamental rights and duties
CO2. functions and powers of LokhaSabha and RajyaSabha
CO3. understand the working of civic bodies 4 distinguish legally right and wrong things

Unit 1

Meaning and Importance of Constitution, Preamble and Salient Features of the Constitution.

Unit 2

Fundamental Rights, Right to Equality, Right to Freedom, Right against exploitation, Right to freedom of religion, Cultural and Educational Rights, Right to Constitutional Remedies and Duties, Directive Principles of State Policy.

Unit 3

Union Government – LokSabha and RajyaSabha Composition, Powers and functions: The President, The Prime Minister and Supreme Court: Role Position and Powers/ functions.

Unit 4

State Government - Legislative Assembly and Legislative Council: Composition, Powers and functions: The Governor, Chief Minister and High Court: Role, Position and Powers/ functions.

Unit 5

Local self Government, Panchayat Raj System in India; Election Commission; Public Service Commissions, Role, powers and function

Skill development Activities:

- Court Visit & Report Presentation
- Group discussion(Fundamental rights and duties)

REFERENCES:

1. Introduction to The constitution of India – M V Pylee, Vikas publishing house Pvt LTD
2. Introduction to The constitution of India – Dr. Durga das Basu, 19th edition Reprint 2007

Objective: To enable students to acquire a broad conceptual framework of electromagnetic phenomena.

Course Outcome:

CO1	The students will be able apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
CO2	The students will be able use an understanding of calculus along with physical principles to effectively solve problems encountered in everyday life
CO3	The students will be able design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.

Unit I:

Electrostatics: Electrical pressure on a charged surface. The path traced by a charged particle in a transverse electric field. The attracted disc electrometer – construction, theory and applications.

Review of concept of electric field and electric field due to point charge. Electric field due to (i) electric dipole, (ii) line of charge and (iii) charged disc

A dipole in an electric field, torque on a dipole in uniform and non-uniform E fields, potential energy of an electrical dipole.

Unit II:

Electric Fields in matter :Capacitance, parallel plate capacitor, calculation of capacity of a spherical and cylindrical capacitor, energy stored in a capacitor, capacitor with dielectric, atomic view of dielectrics, polarization, electric field due to a polarised material, Gauss's law in dielectrics, Dielectric constant, Energy density of an electrostatic field (with and without dielectric).

Polarisability and susceptibility – Frequency dependence of polarisability, Clausius- Mossotti equation.

Unit III:

Magneto statics: Review of Ampere's law, B near a long wire, Magnetic lines of induction, force between two parallel conductors, definition of ampere, B for a solenoid, Biot-savart's law, and applications of Biot-savart's law.

The magnetic field, Lorentz force and definition of magnetic field, magnetic induction, magnetic force on a current element, circulating charges, Cyclotron resonance frequency, Cyclotron.Magnetisation, magnetization current density, magnetic field intensity, magnetic susceptibility and permeability.

Unit IV:

Electromagnetic Induction: Review of Faraday's law, Faraday's experiment, Lenz's law, Time varying magnetic fields, Application in betatron.

Inductance: Self-inductance, LR circuit, energy in a magnetic field, magnetic energy density.

Unit V:

Alternating current and filter: R M S values, Response of LR, CR and LCR circuits to sinusoidal voltages (discussion using the j symbol), Series and parallel resonance, Half-power frequencies, bandwidth and Q-factor, Power in electrical circuits, power factor, Maximum power transfer theorem (with proof).

High-pass and low-pass filters with LR and CR combinations, Cut-off frequency, Band-pass filters

PRACTICALS

(A minimum of ten experiments to be done from the list given below)

1. Determination of Q factor by series resonance
2. Determination of Q factor by parallel resonance
3. Determination of self-inductance of a coil using Anderson's Bridge
4. Determination of capacitance by measuring impedance of RC circuit
5. Determination of Inductance by measuring impedance of RL circuit
6. Mutual inductance of a solenoid by Ballistic Galvanometer
7. De Sauty's Bridge
8. Determination of resistivity of a material using low resistance
9. Determination of the specific charge of a copper(Cu^{++}) ion using Copper Voltammeter
10. Study of decay of current in LR and RC circuit
11. Measurement of B by current balance
12. To show that the behavior of an inductance in an AC circuit is analogous to that of a resistor which obeys Ohm's Law and hence to measure inductance.

Text books:

1. Electricity and Magnetism, Fewkes and Yarwood.
2. Electricity and Magnetism: A N Matveev, Mir Publishers, Moscow.
3. Electricity and Magnetism, F.W.Sears, Addison Wesley Co.
4. K. K. Tewari: Electricity and magnetism, S.Chand Co. Ltd., New Delhi, Reprint 2007.

References:

1. Fundamentals of Physics, 6th Edition, David Halliday, Robert Resnick and Jearl Walker, John Wiley, Inc.
2. Fundamentals of Electricity and Magnetism: A F Kipp, McGraw Hill.
3. Halliday/Resnick/Walker: Fundamentals of Physics, 8th edition, John Wiley & Sons(Asia) Pte. Ltd.
4. B. B. Laud: Electrodynamics, Wiley Eastern Limited, New Delhi.

5. David. J. Griffiths: Introduction to Electrodynamics, 3rd edition, Prentice-Hall of India Private Limited, New Delhi.
6. W.H. Hayt and J. A. Buck: Engineering Electromagnetism , 6th edition, Tata McGraw Hill, New Delhi.
7. BrijLal and N.Subrahmanyam : A text book of Electricity and Magnetism, 19th edition- RatanPrakashanMandir, Educational and University Publishers, Agra.
8. A.B.BhattacharyaR.Bhattacharya, Under Graduate Physics, Volume II, New Central Book Agency(P) Ltd., Kolkata.
9. D.N. Vasudeva: Fundamentals of Magnetism and Electricity, 12th edition-S.Chand and Co. Ltd., New Delhi

18MAT201

DIFFERENTIAL EQUATIONS

3 -1 -0 4

Objectives: To enable students to develop the knowledge of standard concepts of ordinary differential equations and apply analytical techniques to compute solutions to various differential equations.

Course Outcome:

CO1	The students will be able to expresses the existence-uniqueness theorem of differential equations. 2.1. Solves exact differential equations,
CO2	The students will be able to will be able to solve first-order ordinary differential equations.

Ordinary Differential Equations

Unit I:

Review of differential equations (order, degree, linear, nonlinear, implicit and explicit form of solution, general solutions, particular solution, singular solution). Exactness, nonexact equations reduce to exact form.

Part I: 1.1-1.9, 2.12-2.22

Equations of first order but of higher degree: Equations solvable for $\frac{dy}{dx}$, y , x , equations in Clairaut's form equations reducible to Clairaut's form.

Part I: 4.1-4.11

Unit II:

Equations of Second order: Linear homogeneous differential equations with constant coefficients, Euler- Cauchy equation, Linear Nonhomogeneous Differential Equations: Wronskian, linear independence, Method of undetermined coefficients. Method of variation of parameters.

Part I: 5.1-5.5, 6.1-6.3, 1.12, 1.13, 5.26-5.27, 7.1-7.5

Unit III

Systems of first order linear equations: Conversion of n th order differential equation to n first order differential equations, homogeneous linear system with constant coefficients, fundamental matrices, complex eigen values, repeated eigenvalues. simultaneous linear differential equations with constant coefficients, simultaneous linear differential equations with variable coefficients,

Part I: 8.1-8.3, 2.1- 2.7

Partial Differential Equations

Review of partial differential equations (order, degree, linear, nonlinear).

Unit IV

Formation of equations by eliminating arbitrary constants and arbitrary functions.

Solutions of partial differential equations: General, particular and complete integrals. Lagrange's linear equation, Charpit's method, Methods to solve the first order partial differential equations of the forms $f(p,q) = 0$, $f(z,p,q) = 0$, $f_1(x,p) = f_2(y,q)$ and Clairut's form $z = px + qy + f(p,q)$ where $p = \frac{\partial z}{\partial x} \wedge q = \frac{\partial z}{\partial y}$.

Part III: 1.1 – 1.5, 2.3-2.12, 3.1-3.2, 3.7-3.8, 3.10-3.18

Unit V

Classification of partial differential equations of second order. Homogeneous linear partial differential equations with constant coefficient of higher order. Non-homogeneous linear partial differential equations of higher order.

Part III: 8.1, 4.1-4.12

Text books:

1. M.D. Raisinghania, Ordinary and Partial Differential Equations, S.Chand, 18th edition, 2016.

References:

1. William E. Boyce and Richard C. DiPrima, Elementary differential equations and boundary value problems, Wiley india, 9th edition, 2012.
2. Nita H, Shah, Ordinary and Partial Differential Equations : Theory and Applications, PHI learning, 2nd edition, 2015.
3. Dennis Zill, A First Course in Differential Equations, Cengage Learning, 9th edition, 2009.

18CSA204**OBJECT ORIENTED PROGRAMMING****3- 0- 2 4**

Objective: The purpose of this course is to understand the object oriented programming concepts and to implement those concepts to solve problems.

Course Outcome:

CO1	The students should be able to understand features of C++ supporting the object oriented programming
CO2	The students should be able to understand the relative metrics of C++ as an object oriented programming language

Unit I:

Introduction: Characteristics of Objects, Object Oriented Development, Object Oriented Themes – Abstraction, Encapsulation, Polymorphism and Inheritance.

Unit II:

Basic C++ Concepts: Classes and objects, Constructors and Destructors, Function overloading, Operator overloading, Friend Function.

Unit III:

Generalization and Inheritance – Single, multi-level, Hierarchical, Hybrid, Multiple Inheritance, Constructors and Destructors in derived classes.

Unit IV:

Virtual base class, Polymorphism – Compile Time and Run time, Function overriding, Abstract Classes. Introduction of Virtual functions.

Unit V:

Templates, Exceptions – Concept, Implementation of user defined exceptions. Files – Input, output Streams.

Text books:

1. Object Oriented Programming with C++ - E. Balagurusamy, TMH.

2. Object Oriented Design and Modeling – James Rambaughetal, PHI.

References:

1. Object Oriented Conceptual Modeling – Dillon and Lee, PHI.
2. Introduction to Object Oriented Analysis and Design – Stephen R. Shah, TMH.
3. The Waite’s Group OOP using C++ - Robert S. Lafore, Galgotia Publications.

18PHY215

OPTICS

3-0-2 4

Objectives: To enable students to understand that light is a wave phenomenon and apply the understanding of wave phenomenon to light.

Course Outcome:

CO1	The students will be able to gain knowledge on various theories of light.
CO2	The students will be able to acquire skills to identify and apply formulas of optics and wave physics

Unit I:

Wave Nature of Light and Interference: Light-electromagnetic spectrum, Rotating mirror method of determination of speed of light, Huygen’s principle, explanation of reflection and refraction, Fermat’s Principle, Phase change on reflection, total internal reflection.

Young’s experiment - coherence, intensity distribution and visibility of fringes, Newton’s rings, Fresnel’s Biprism, interference in thin films, colours of thin films, interference at an air wedge, Michelson’s interferometer.

Unit II :

Diffraction: Fraunhoffer and Fresnel: Diffraction, Diffraction at a single slit, double slit, Diffraction by multiple slits, Diffraction grating, Resolving power – Rayleigh’s criterion, Resolving power of a grating and telescope.

Fresnel diffraction, half period zone, zone plate, diffraction at a circular aperture and at a straight edge (qualitative treatment only).

Unit III:

Polarization : Polarization by reflection, Brewster’s law, Mauls law, Double refraction, Production and detection of linearly, circularly and elliptically polarized light, Quarter and half wave plates, Polaroid’s, Discussion on use of Polaroid sheets in preparing tinted sunglasses, Optical activity.

Unit IV:

Scattering of Light: A brief discussion on Tyndall effect, Rayleigh scattering and Raman effect. Blue of the sky and ocean.A qualitative account of fluorescence and phosphorescence. Raman effect: Classical and quantum theory of Raman effect, experimental method for studying Raman spectra, Raman spectrum, study of Raman effect using Lasers, intensity of Raman lines, Polarization of Raman lines, characteristic properties of Raman lines, applications of Raman effect.

Unit V:

Introduction to Lasers: Spontaneous and stimulated emission, density of states, Einstein's A and B coefficients. Ratio of stimulated to spontaneous transitions in a system in thermal equilibrium, condition for amplification, population inversion, methods of optical pumping, energy level schemes of He-Ne and Ruby Laser. Properties and uses of Lasers.

Basic concepts of holography – construction of hologram – Discussion on the use of holograms in daily life - Recording and reproduction of holograms.

PRACTICALS

1. Determination of wavelength of mercury spectral lines using Diffraction Grating by normal incidence method
2. Determination of the refractive index of the material of a prism by minimum deviation method
3. Determination of Cauchy's constants using a prism, grating and spectrometer
4. Determination of the resolving power of a telescope
5. Determination of wave length of monochromatic light source using Bi-Prism
6. Resolving power of a grating
7. Wavelength and wavelength difference using a Michelson's interferometer
8. Determination of the thickness of paper by interference at a wedge
9. Determination of the radius of curvature of the lens by Newton's Rings
10. Determination of the refractive index of a liquid by Newton's rings
11. Verification of Brewster's Law
12. Refractive index of a prism by i-d curve

Text books:

1. N Subramanyam Brijlal: Waves and Oscillations, 2nd edition, Vikas Publishing house Pvt. Ltd., New Delhi.
2. A.B. Bhattacharya R. Bhattacharya, Under Graduate Physics, Volume I, New Central Book Agency (P) Ltd., Kolkata.
3. N. Subrahmanyam Brijlal and Dr. M.N. Avadhanulu: A text book of Optics, 24th revised edition - S. Chand & company Ltd, New Delhi

References:

1. Halliday/Resnick/Walker: Fundamentals of Physics, 8th edition, John Wiley & Sons (Asia) Pte. Ltd.
2. F A Jenkins and H E White: Optics, McGraw-Hill, 3rd Edition, (1957)
3. Khanna and Bedi: Sound
4. S K Gupta, O P Varma: Waves and Oscillations, 3rd edition, R. Chand & Co., New Delhi.
5. R.L. Saihgal, A Text Book of Sound, S. Chand & Company Ltd. New Delhi, Reprint 1990.
6. P.K. Mittal & Jai Dev Anand, A Text Book of Sound, Har-Anand Publications, New Delhi.
7. N V Suryanarayana: Electrical Measurements and Measuring Instruments, 1st edition, S. Chand & Co. Ltd., New Delhi.
8. H S Kalsi: Electronic Instrumentation, 2nd edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

9. D.R. Khanna and H.R. Gulati: Fundamentals of Optics, 15th edition- R. Chand publishers, New Delhi.

10. R. MurugesanKiruthigaSivaprasath: Optics and Spectroscopy , 17th revised edition- S.Chand& company Ltd, NewDelhi

18MAT222

MODERN ALGEBRA

3-1-0 4

Objectives: To enable students to understand fundamental concepts of algebra and apply results from elementary group theory to solve contemporary problems.

Course Outcome:

CO1	Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element.
CO2	Students will be knowledgeable of different types of subgroups such as normal subgroups, cyclic subgroups and understand the structure and characteristics of these subgroups.

Unit I:

Introduction to Groups. Symmetries of a Square. The Dihedral Groups. Definition and Examples of Groups. Elementary Properties of Groups Finite Groups; Subgroups, Terminology and Notation. Subgroup Tests, Examples of Subgroups.

Chapters 2 and 3.

Unit II:

Cyclic Groups, Properties of Cyclic Groups. Classification of Subgroups of Cyclic Groups, Permutation Groups, Properties of Permutations, Isomorphism's, Definition and Examples. Cayley's Theorem, Properties of Isomorphism's.

Chapters 4-7.

Unit III:

Automorphisms, Cosets and Lagrange's Theorem, Application of Cosets to Permutation Groups. Normal Subgroups, Factor Groups, Applications of Factor Groups. Group Homomorphisms, Definition and Examples, Properties of Homomorphisms, The First Isomorphism Theorem. Chapters 11-13.

Unit IV:

Rings-Motivation and Definition, Examples of Rings. Properties of Rings. Subrings. Integral Domains.

Chapters 23-24.

Unit V:

Quotient Rings and Ideals. Homomorphism of rings and rings of polynomials.

Chapters 28-30.

Text books:

1. A First course in abstract algebra, Johan B. Fraleigh, third edition, Narosa, 2000.

References:

1. Garrett Birkoff and Saunders Mac Lane, 'A Survey of Modern Algebra', Universities Press, 2003.
2. I. N. Herstein, 'Topics in Algebra', Second Edition, John Wiley and Sons, 2000.
3. M. Artin, 'Algebra', Prentice Hall inc., 1994.

18CSA213**DATA BASE MANAGEMENT SYSTEMS****3-0-2 4**

Objective: To understand the role of a database management system in an organization by understanding basic database concepts, including the structure and operation of the relational data model. To construct simple and moderately advanced database queries using Structured Query Language (SQL) and to successfully apply logical database design principles, including E-R models and database normalization.

Course Outcome:

CO1	The students should be able to master the material. At the end of this class, the successful student will: have a broad understanding of database concepts and database management system software. have a high-level understanding of major DBMS components and their function.
CO2	The students should be able to describe the fundamentals of relational database.

Unit I:

Database Management System model: Introduction, Implication of Database, Applications Database System; Data Independence; Data Modeling for a Database; Advantages and Disadvantages of Database Management System, DBMS Vs RDBMS, Entities, Attributes, Relationships and Relationships Types.

Unit II:

Database System Architecture: Three Level Architecture of DBMS, The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, Mapping; Database Management System Facilities, Data Definition Language, Data Manipulation Language; Database Manager, Database Administrator, Data Dictionary; Distributed Processing, Information and Communications Technology System (ICT), Client / Server Architecture

Unit III:

Relational Algebra: Basic Operations, Union, Difference, Intersection, Cartesian product; Additional Relational Algebraic Operations, Projection, Selection, JOIN, Division.

Database Models and Implementation: Data Model and Types of Data Model, Relational Data Model, Hierarchical Model, Network Data Model.

Entity-Relationship Model: E-R Diagrams, Notation used in E-R Model, Relationships and Relationship Types, Case study to implement E-R Diagrams.

Unit IV:

SQL: Categories of SQL Commands; Data Definition; Data Manipulation Statements, SELECT - The Basic Form, Subqueries, GROUP BY Feature.

Unit V:

Normalization: Functional Dependency; Anomalies in a Database; Properties of Normalized Relations; First Normalization; Second Normal Form; Third Normal Form; Boyce-Codd Normal Form (BCNF); Fourth and Fifth Normal Form

Transaction Processing: Atomicity Consistency and Isolation, Durability, Transaction States.

References:

1. Silberschatz. Korth. Sudarshan: "Database System Concepts" 6th Edition McGraw-Hill International Edition
2. Ivan Bayross: "Sql- PL/SQL The Programming Language Of Oracle"- 4rd Edition- Bpb Publications

18PHY305

BASIC ELECTRONICS

3 -0 -0 3

Objectives: To enable students to understand the physics of semiconductors and their applications in basic electronic circuits.

Course Outcome:

CO1	To understand operation of semiconductor devices.
CO2	To understand DC analysis and AC models of semiconductor devices.

Unit I:

Semiconductor Characteristics and Applications Review: Intrinsic and extrinsic semiconductors, electrons and holes in intrinsic and extrinsic semiconductors, conduction by electrons and holes, conductivity of a semiconductor, Energy bands in semiconductors. Carrier concentrations in intrinsic and extrinsic semiconductors, Fermi level, donor and acceptor levels in extrinsic semiconductors.

P-N junction diode – depletion layer, conduction in PN junction diode, characteristics, diode resistance.

Half wave and full wave rectifiers, power output and efficiency, Ripple factors.

Breakdown in diodes – Zener breakdown, Zener diode characteristics and application in voltage regulation.

LEDs, photo diodes, LDRs and Solar cells.

Unit II:

Transistors and Applications : Bipolar junction transistor (PNP and NPN) transistors, different configurations and characteristics, current components in CE configuration, large signal and small signal dc current gains, transistor biasing – self bias circuit, Load line and operating point.

Transistor as an amplifier : Transistor as a two port device, h-parameters and analysis of CE amplifier using h parameter equivalent circuit, simplified h-parameter circuit, stabilization of voltage gain in CE amplifiers, Two stage amplifiers, RC coupling, frequency response of CE amplifier. Comparison of transistor configurations.

Emitter follower circuit and its use. Transistor as Power amplifier.

FET construction and its characteristics – MOSFET characteristics.

Concept of feedback in amplifiers and advantages of negative feedback

Unit III:

Basic Principles of sinusoidal oscillators, Statement and explanation of Barkhausen criterion for sustained oscillations, RC phase –shift Oscillator, explanation of: tank circuit and

Development of oscillations in an LC circuit, Hartley Oscillator, Colpitt's Oscillator, Wien Bridge Oscillator, Piezoelectric effect, Piezoelectric Oscillator..

Unit IV:

Digital Electronics: Binary to decimal and decimal to binary conversion, Binary addition and subtraction, Octal number system, Hexadecimal system and conversions.

Construction and working of AND and OR logic gates using diodes. Construction of NOT gate using transistor. Symbols and truth table for AND, OR, NOT, NAND NOR and Ex-OR logic gates.

Boolean algebra, Boolean laws, D'morgan's theorem. NAND and NOR as universal gates.

Introduction to OP-AMP. Differential amplifiers, principle of OP-AMP, OP-AMP parameters, Applications – Addition, Subtraction, differentiation and integration.

Unit V:

Communication Electronics: Basic theory of amplitude modulation, Power in modulated carrier, single side band transmission, Basic idea of frequency and phase modulation. Modulated class C amplifier, demodulation, and PN diode as demodulator linear and square law detection.

Propagation of radio waves, different layers of ionosphere and their functions,

Radio communication: Role of ionosphere in radio communication. Block diagram of Radio transmission. The block diagram and diagram of super heterodyne AM Receiver.

Text books:

1. V.K. Mehta: Electronics.
2. BapatYN: Electronic circuits and Systems, TMH , New Delhi.
3. RamakantGaekwad: Operational amplifiers and Linear Integrated Circuits, Prentice hall of India ltd, New Delhi.

References:

1. Concepts of modern physics, 6th Edition- A Beiser
2. Resnick: Special theory of relativity
3. A.P French: Special relativity
4. Malvino: Electronic principles, Fifth edition
5. C. Kittel: Introduction to solid state physics
6. A J. Dekkar: Solid State physics
7. J.B. Blackmore: Introduction to solid state physics
8. S V Subramanyam : Experiments in Electronics
9. R P Jain: Modern Digital Electronics
10. Malvino and Leach: Digital principles and applications
11. Grob B: Basic Electronics
12. Boylestead: Network analysis

18PHY381**PRACTICALS****0- 1-2 2**

Objectives: To enable students to understand the physics of semiconductors and their applications in basic electronic circuits.

Course Outcome:

CO1	To understand operation of semiconductor devices.
CO2	To understand DC analysis and AC models of semiconductor devices.

(A minimum of ten experiments to be performed from the following list)

1. Junction diode characteristics
2. Zener diode characteristics
3. Junction Transistor characteristics
4. FET characteristics
5. Wien Bridge Oscillator.
6. UJT characteristics.
7. Full adder using AND, OR and XOR gates
8. Study of op-amp characteristics.
9. Measurement of efficiency and output power of LED.
10. Verification of the inverse square law for light intensity using a phototransistor.
11. Study of Optocoupler.
12. Study of Divergence of Diode laser.
13. Amplitude demodulator.

14. Logic gates – AND, OR, NOT, NOR and XOR using IC 7402

18MAT301

REAL ANALYSIS

2 -1 -0 3

Objectives: To enable students to understand the basic properties of the field of real numbers and understand notion of continuous functions and their properties.

Course Outcome:

CO1	To understand the comprehend rigorous arguments developing the theory underpinning real analysis .
CO2	To understand the demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.

Unit I:

Review: Sets and Functions, Mathematical Induction, Finite and Infinite Sets.

The Real Numbers-The Algebraic and Order Properties of \mathbb{R} , Absolute Value and the Real Line, the Completeness Property of \mathbb{R} , Applications of the Supremum Property.
Chapter-2 (Sec.2.1-2.3)

Unit II :

Sequences and Series-Sequences and Their Limits, Limit Theorems, Monotone Sequences, Subsequences and the Bolzano-Weierstrass Theorem, The Cauchy Criterion, Properly Divergent Sequences, Introduction to Infinite Series.

Chapter-3 (Sec.3.1-2.6)

Review of Limits-Limits of Functions, Limit Theorems. (Chapter-4, review only)

Unit III:

Continuous Functions-Continuous Functions, Combinations of Continuous Functions, Continuous Functions on Intervals, Uniform Continuity.

Chapter-5 (Sec.5.1-5.4)

Unit IV :

Differentiation-The Derivative, The Mean Value Theorem, L'Hospital's Rules, Taylor's Theorem.

Chapter-6 (Sec.6.1-6.4)

Unit V:

The Riemann Integral- Riemann Integral, Riemann Integrable Functions, The Fundamental Theorem.

Chapter-7 (Sec.7.1-7.4)

Text books:

Introduction to Real Analysis, by Robert Gardner Bartle, Donald R. Sherbert, Fourth Edition, John Wiley and Sons, 2011.

References: Mathematical Analysis by Tom M. Apostol, Second Edition, Narosa publishing house, New Delhi, 1989.

1. Principles of Mathematical Analysis by Rudin.W, Third Edition, McGraw-Hill International Editions, 1976.
2. Real Analysis by H.L. Royden and P.M.Fitzpatrick. Fourth Edition. Pearson Education Asia Limited, 2010.

18MAT112

DISCRETE MATHEMATICS

1- 1 -0

Objectives: To enable students to understand the basics of logic, permutations and combinations and use effectively algebraic techniques to analyse basic discrete structures and algorithms

Course Outcome:

CO1	To understand the comprehend rigorous arguments developing the theory underpinning real analysis .
CO2	To understand the demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.

Unit I

Logic: Logic, Propositional Equivalence, Predicate and Quantifiers, Theorem Proving.
Chapter-1 (Sections: 11.-1.5)

Unit II

Basics of Counting, Pigeonhole Principle, Permutation and Combinations.
Chapter-4 (Sections: 4.1-4.3)

Unit III

Advanced Counting Techniques and Relations: Recurrence Relations, Solving Recurrence Relations, Solutions of Homogeneous Recurrence Relations.
Chapter-6 (Sections: 6.1-6.2)

Unit IV

Relations and Their Properties: Representing Relations, Closure of Relations, Partial Ordering, Equivalence Relations and partitions.
Chapter-7 (Sections: 7.1, 7.3-7.6)

Unit V

Graph Theory: Introduction to Graphs, Graph Operations, Graph and Matrices, Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest Path Problems.
Chapter-8 (Sections: 8.1, 8.4-8.6)

Text books:

1. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, Tata McGraw- Hill Publishing Company Limited, New Delhi, Sixth Edition, 2007.

References:

1. R.P. Grimaldi, “Discrete and Combinatorial Mathematics”, Pearson Education, Fifth Edition, 2007.
2. Thomas Koshy, “Discrete Mathematics with Applications”, Academic Press, 2005.

- Liu, "Elements of Discrete Mathematics", Tata McGraw- Hill Publishing Company Limited , 2004

18CSA304 INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS 3 -0 -0 3

Objective: To enable the students to learn the Elementary Data Structures and algorithms and to understand the various design and analysis of the algorithms.

Course Outcome:

CO1	The students should be able to understand the ability to analyse algorithms and its correctness.
CO2	The students should be able to summarize searching and sorting techniques.

Unit I:

Introduction: Overview – How to create programs and analyze them. Arrays – Structures - Ordered List – Representation of arrays – Simple Applications.

Unit II:

Stacks and Queues: Fundamentals – Structures – Operations – Multiple stacks and queues – Applications - Evaluation of Expressions.

Unit III:

Linked Lists: Singly Linked List – Linked Stacks and Queues - The Storage Pool – Applications – Polynomial addition, Sparse Matrices – Doubly Linked List – Dynamic Storage Management – Garbage Collection and Compaction

Unit IV:

Searching and Sorting: Binary, Sequential and Fibonacci Searching – Internal Sorting: Insertion, Quick, Merge, Heap, Radix sorts – External Sorting: Sorting with Disks – K-way Merging – Sorting with Tapes – Balanced Merge – Poly-phase Merge – Symbol Tables – Static tree – Dynamic Tree – Hash Tables.

Unit V:

Files: Files, Queries and Sequential organization – Indexed Techniques – File Organization: Sequential, Random, Linked Organization – Inverted Files – Cellular Partitions. Introduction to trees and types.

Text books:

- FUNDAMENTALS OF DATA STRUCTURES - Ellis Horowitz and SartajSahni;,Galgotia Book Source, 1999.

References:

1. PROGRAMMING AND DATA STRUCTURES - Askok N Kamthane, Perason Education, 2004.

18CSA381

DATA STRUCTURES ALGORITHMS LAB

0 -1 -2 2

Objective: To enable the students to learn the Elementary Data Structures and algorithms and to understand the various design and analysis of the algorithms.

Course Outcome:

CO1	The students should be able to understand the ability to analyse algorithms and its correctness.
CO2	The students should be able to summarize searching and sorting techniques.

1 Write a C program that uses functions to perform the following:

- a) Create a singly linked list of integers.
- b) Delete a given integer from the above linked list.
- c) Display the contents of the above list after deletion.

2 Write a C program that uses functions to perform the following:

- a) Create a doubly linked list of integers.
- b) Delete a given integer from the above doubly linked list.
- c) Display the contents of the above list after deletion.

3 Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.

4 Write C programs to implement a double ended queue ADT using

- i) array
- ii) doubly linked list

5 Write a C program that uses functions to perform the following:

- a) Create a binary search tree of characters.
- b) Traverse the above Binary search tree recursively in Postorder.

6 Write a C program that uses functions to perform the following:

- a) Create a binary search tree of integers.
- b) Traverse the above Binary search tree non recursively in inorder.

7 Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:

- a) Insertion sort
- b) Merge sort

8 Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:

- a) Quick sort
- b) Selection sort

- ❖ Elective C
- ❖ Elective D

SEMESTER VI

18PHY316

ATOMIC AND MOLECULAR PHYSICS

3- 0- 0 3

Objective: To enable students to apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level.

Course Outcome:

CO1	The students will introduce about the forces, angular momentum and knowledge about the Constraints.
CO2	The course will give knowledge about the general parameter like velocity, acceleration.

Unit I

X-Rays: Continuous X-ray spectra. Duane and Hunt limit. Characteristic X ray spectra, Moseley's law and its significance, X-ray energy levels.

Bragg's law and Bragg spectrometer. A brief mention of different types of crystals. Structures of NaCl and KCl crystals.

Compton Effect – Expression for Compton Shift.

Unit II

Atomic Spectra (16 hrs)

The Electron: Determination of e/m of an electron by Thomson method, Determination of charge of an electron by Millikan's oil drop method.

Atomic Spectra : Inadequacy of Bohr atomic model, correction due to finite mass of the nucleus, Rydberg constant in terms of reduced mass, Excitation and Ionisation potentials, Franck-Hertz experiment, Bohr-Sommerfeld Model of atom, vector model of an atom, Electron spin, space quantisation, magnetic moment of an electron due to its orbital motion. Stern-Gerlach experiment and its theory.

Spin-orbit interaction and Fine structure of spectral lines. Quantum numbers and selection rules. Pauli's exclusion principle. Electronic configuration of atoms. Valence electron and a brief mention of L-S and J-J coupling for two electron atoms.

Unit III

Zeeman effect : Introduction, experimental study of normal Zeeman effect, theory of normal Zeeman effect, expression for Zeeman effect, quantum theory of normal Zeeman effect, anomalous Zeeman effect, Paschen-Back effect and Stark effect.

Unit IV

Molecular Spectra (10 hrs): Molecular formation, the H molecular ion, H₂ – molecule. Salient features of molecular spectra.

Rotation, vibration and electronic spectra of molecules, associated quantum numbers and selection rules. Theory of pure rotation and rotation- vibration spectra, Raman and IR spectra, simple applications.

Unit V

Electromagnetic Theory And Maxwell's Equations (12 hrs.) : Displacement current, Setting up of Maxwell's equations in SI units, Hertz experiment, Travelling electromagnetic wave, Wave equations (qualitative and quantitative) – Energy transport and Poynting vector, Poynting theorem. A radiation pressure (Normal and Oblique incidence). Concept of electric dipole, magnetic dipole, expression for energy radiated by a dipole (No derivation)

Text books:

1. Atomic and nuclear physics -Littlefield and T.V. Thorley
2. Molecular spectra – G Herzberg
3. Fundamental university physics, vol. 3 – Aloson and Finn

References:

1. Perspectives of Modern Physics Beiser.
2. Electromagnetism, Reitz and Milford.
3. Concepts of modern physics, Fifth Edition- ABeiser
4. Introduction to modern Physics- F.R. Richtmeyer. E.H. Kennard and T. Lauritsen
5. Lasers – A K Gatak
6. Modern Physics - K.S. Krane
7. Introduction to modern Physics – H S Mani and G K Mehta

18PHY382

PRACTICALS

0 -1- 2 2

Objective: To enable students to apply the basic knowledge of classical and quantum mechanics at the atomic and molecular level.

Course Outcome:

CO1	The students will introduce about the forces, angular momentum and knowledge about the Constraints.
CO2	The course will give knowledge about the general parameter like velocity, acceleration.

(A minimum of eight experiments from the following)

1. Determination of Rydberg constant by studying the Fraunhofer spectrum
2. Analysis of powder X ray photograph
3. Study of the characteristics and spectral response of a photocell (selenium photocell)
4. Study of hydrogen spectrum
5. Analysis of band spectrum of PN molecule.
6. Analysis of rotational spectrum of nitrogen.
7. Analysis of rotational vibrational spectrum of a diatomic molecule (HBr).
8. Absorption spectrum of KMnO_4
9. Determination of dipole moment of an organic liquid
10. Spectral response of a photodiode and its I–V characteristics.

18MAT632

COMPLEX ANALYSIS

2- 1- 0 3

Objectives: To enable students to obtain knowledge of theory of complex functions of a complex variable and get acquainted with different methods and techniques of series and bilinear transformations.

Course Outcome:

CO1	The students should be able to demonstrate understanding of the basic concepts underlying complex analysis.
CO2	The students should be able to demonstrate familiarity with a range of examples of these concepts.

Unit I

Definition, Algebra of complex numbers, polar forms, regions, Limits, continuity, differentiability Analyticity, CR equations, Harmonic Functions.

Chapters 1 & 2

Unit II

Conformal mappings, bilinear transformations, Special bilinear transformations, fixed points.

Chapter-9 (Sections: 9.1-9.3)

Unit III

Contour integral, Cauchy-Goursat theorem, Cauchy's integral formula, winding number, Primitives

Chapter-4 (Sections: 4.1-4.4, 4.7)

Unit IV

Sequences, series, power series, uniform convergence of power series, Taylor's series, Laurent's series, Integration and differentiation of Power series.

Chapters- 5 & 6 (Sections: 5.1-5.2, 6.1, 6.3-6.5)

Unit V

Zeros and singularities of analytic functions, types of singularities, poles, residue theorem.

Chapter-7 (Sections: 7.1-7.3)

Text books:

1. H S Kasana, Complex variables and Theory and Applications, second edition, Prentice Hall India

References:

1. S. Ponnusamy, *Foundations of Complex Analysis*, 2nd Edition, Narosa Publishing House, 2005.
2. J.W. Brown and R.V. Churchill, *Complex Variable and Applications*, McGraw Hill, 2008
3. R. Roopkumar, *Complex Analysis*, Pearson Education, 2014, Chennai

18MAT202

PROBABILITY AND STATISTICS

1- 1- 0 2

Objectives: To enable students to understand the properties of probability and probability distributions and apply wide variety of specific statistical methods.

Course Outcome:

CO1	The students should be able to understand the basic concepts in probability theory and statistical analysis.
CO2	The students should be able to learn the fundamental theory of distribution of random variables, the basic theory and techniques of parameter estimation and tests of hypotheses.

Unit I:

Probability Concepts: Important definitions- random experiment, trial, sample space, mutually exclusive events, independent events, dependent events, equally likely events, exhaustive events – approaches to measuring probability.

Unit II:

Random Variables: Discrete and continuous random variables – discrete and continuous distribution functions- mathematical expectation..

Unit III:

Distributions: Standard distributions- discrete distributions Binomial, Poisson. Continuous distributions uniform, exponential, Normal distributions.

Unit IV:

Correlation: Introduction to simple correlation - scatter plot and correlation coefficient, properties of correlation coefficient, rank correlation coefficient.

Unit V:

Regressions: Introduction to simple regression, regression lines.

Text books:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Probability and Statistics for Engineers and Scientists, 8th Edition, Pearson Education Asia, 2007.

References:

1. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, John Wiley and Sons Inc., 2005
2. Ravichandran, J. Probability and Statistics for engineers, First Reprint Edition, Wiley India, 2012.

Text book:

Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Probability and Statistics for Engineers and Scientists, 8th Edition, Pearson Education Asia, 2007.

References:

1. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, John Wiley and Sons Inc., 2005
2. Ravichandran, J. Probability and Statistics for engineers, First Reprint Edition, Wiley India 2012.

18CSA314 SYSTEM PROGRAMMING AND OPERATING SYSTEM 3 -0 -0 3

Objective: To inculcate knowledge on Operating System concepts and functioning of modern Operating System.

Course Outcome:

CO1	The students should be able to understand the think critically and analyze problems; find effective solutions to achieve desired objective
CO2	The students should be able to analyze, design programs to demonstrate basic knowledge of <i>systems</i> software and operating <i>systems</i> .

Unit I:

Language processors: introduction, languages processing activities, fundamentals of language processing, Assemblers- elements of assembly language programming, a simple assembly scheme. Compilers and interpreters- aspects of compilation, memory allocation, compilation of expressions, Linkers-relocation and linking concepts, design of a linker, self-relocating programs

Unit II:

Operating System Overview: Operating System Objectives and Functions – The Evolution of Operating Systems – Major Achievements – Developments Leading to Modern Operating Systems – Microsoft Windows Overview – Traditional UNIX Systems – Modern UNIX Systems – Linux. OS-Functions and Structure: Different Services of Operating System – Operating System Structure – Booting. Information Management: The File System - Device Driver.

Unit III:

Process Management: What Is a Process? – Evolution of Multiprogramming – Context Switching – Process States – Process State Transitions – Operations on a Process.

Unit IV:

Memory Management: Introduction – Single Contiguous Memory Management – Fixed Partition Memory Management – Variable Partitions – Non-contiguous Allocation – Paging – Segmentation – Combined Systems – Virtual Memory Management Systems.

Unit V:

Distributed Processing, Client/Server and Clusters: Client/Server Computing – Distributed Message Passing- Remote Procedure Calls – Clusters –Windows Cluster – Sun Cluster – Beowulf And Linux Clusters.

Text books:

1. OPERATING SYSTEMS Internals and Design Principles – William Stallings, 5th edition, PHI.
2. OPERATING SYSTEMS – AchyutGodbole , 2nd edition, TMH.
3. System programming and operating systems, second edition, DM Dhamdhare.

References:

1. OPERATING SYSTEMS Concepts and Design – Milan Milankovic, 2nd edition, TMH.
2. MODERN OPERATING SYSTEMS – Andrew S. Tanenbaum, 2 nd edition, PHI.
3. OPERATING SYSTEM PRINCIPLES – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 7 th Edition, Wiley India.
4. Operating System, Galvin, 6th edition

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Objective: To inculcate knowledge on Operating System concepts and functioning of modern Operating System.

Course Outcome:

CO1	The students should be able to understand the think critically and analyze problems; find effective solutions to achieve desired objective
CO2	The students should be able to analyze, design programs to demonstrate basic knowledge of <i>systems</i> software and operating <i>systems</i> .

1. Practicing A to Z bash commands.
2. Write a shell program to find the greatest and smallest of 3 numbers.
3. Write a program to find the factorial of a given number.
4. Write a shell program to find arithmetic operations using SWITCH.
5. Write a shell program to print the prime numbers between 1 and 300.
6. Write a shell program the check the given string is palindrome or not.
7. Write a shell program to display various patterns.
8. Write a shell script to display a list of files in the current directory to with read, write and execute permissions.
9. Write a shell script which works similar to word count command.
10. Write a shell script which will receive any number of file names as arguments. The shell script should check whether every argument supplied in a file or a directory. If it is a directory, it should be appropriately reported. If it is a file name, then the name of the file as well as the number of lines present in it should be displayed.

❖ Project