

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR



B.Sc. (Mathematics)

SYLLABUS

w.e.f June 2016

B. Sc. Mathematics

Course Description: This course is designed to enable students to acquire understanding of fundamentals of Mathematics. The basic ideas of mathematics as a discipline are introduced by different topics in diverse areas of mathematics which may be readily applied to solve problems in the real world.

COURSE STRUCTURE:

Semester I

Part/Class	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem-I B.Sc. (Mathematics)		Semester I					
	CCH-101	Fundamentals of Chemistry-I	4	30	70	100	4
	PCH-101	Chemistry Practicals-I	4		50	50	2
	CPH-101	Introduction to general physics	4	30	70	100	4
	PPH-101	Physics practical-I	4		50	50	2
	CMAT-101	Mathematics- I	6	45	105	150	6
	FCG-101	Basic English-I	2	15	35	50	2
	EGC-101	Communication Skills -1	2		50	50	2
	EMAT-101	Set Theory & Functions	2		50	50	2
				28	120	480	600

Semester II

Part/Class	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem-II B.Sc. (Mathematics)		Semester II					
	CCH-201	Fundamentals of Chemistry-II	4	30	70	100	4
	PCH-201	Chemistry Practicals-II	4		50	50	2
	CPH-201	Fundamental of Physics	4	30	70	100	4
	PPH-201	Physics practical II	4		50	50	2
	CMAT-201	Mathematics-II	6	45	105	150	6
	FCG-201	Basic English-II	2	15	35	50	2
	EGC-201	Communication Skills-II	2		50	50	2
	EMAT-201	Industrial Mathematics- I	2		50	50	2
				28	120	480	600

Semester III

Part/Class	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem-III B.Sc. Mathematics		Semester III					
	CMAT-301	Calculus & Linear Algebra	3	30	70	100	3
	CMAT-302	Numerical Analysis	3	30	70	100	3
	PC-CMAT-I	Mathematics Practical - I	6		100	100	3
	CPH-301	Basic Physics - I	3	30	70	100	3
	CPH-302	Basic Physics - II	3	30	70	100	3
	PPH-301	Physics Practical - III	6		100	100	3
	FCG-301	Basic English-III	2	15	35	50	2
	EMAT-301	Business Mathematics- I	2		50	50	2
	EGC-301	Principles of Management - I	2		50	50	2
				30	135	615	750

Semester IV

Sem IV B.Sc. Mathematics	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
	CMAT-401	Advanced Calculus	3	30	70	100	3
	CMAT-402	Advanced Linear Algebra	3	30	70	100	3
	PC CMAT- II	Mathematics Practical- II	6		100	100	3
	CPH-401	Basic Physics-III	3	30	70	100	3
	CPH-402	Basic Physics-IV	3	30	70	100	3
	PPH-401	Physics Practical-IV	6		100	100	3
	FCG-401	Basic English – IV	2	15	35	50	2
	EMAT-401	Business Mathematics- II	2		50	50	2
EGC-401	Principles of Management II	2		50	50	2	
		30	135	615	750	24	

Semester V

Sem V B.Sc. Mathematics	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
	CMAT-501	Group theory	3	30	70	100	3
	CMAT-502	Mathematical Analysis- I	3	30	70	100	3
	CMAT-503	Differential Equations	3	30	70	100	3
	CMAT-504	Operations Research- I	3	30	70	100	3
	PC CMAT- III	Mathematics Practical-III	12		200	200	6
	EMAT-501	Business Mathematics- III	2		50	50	2
	EGC- 501	Environmental Science & Disaster Management	2		50	50	2
	FCG-501	Compulsory English (L.L.)	2	15	35	50	2
			30	135	615	750	24

Semester VI

Sem VI B.Sc. Mathematics	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
	CMAT-601	Abstract Algebra	3	30	70	100	3
	CMAT-602	Mathematical Analysis- II	3	30	70	100	3
	CMAT-603	Graph Theory	3	30	70	100	3
	CMAT-604	Operations Research - II	3	30	70	100	3
	PC MAT-601	Mathematics Practical - IV	12		200	200	6
	FCG-601	Basic English – VI	2	15	35	50	2
	EMAT-601	Business Mathematics -IV	2		50	50	2
	EGC- 601	Advanced Communication Skills	2		50	50	2
			30	135	615	750	24

RULES AND REGULATIONS

R1: CCH: “Eligibility Criteria (EC)” for Admission

A Candidate for admission to the Bachelor of Science Mathematics) must have a 10+2 Science with A and B (Maths and Physics) group. Provisional admission shall be provided subject to the clearance of examinations and eligibility.

R2: CCH: Admission Procedure

Candidates are selected on the basis of Merit list.

R3: CCH: Examination, Assessment, Passing, Gradation, and Award of Degree

The University has adopted Grade System as desired by U.G.C. w. e. f. 2009-2011 Session. Each academic year is divided into two Semesters and the Course will be completed in 3 years comprising of 6 semesters. The students are continuously evaluated through Mid Term assessments, Assignments, Seminars, End Term examinations, Group discussions, Article writing, Quiz competitions and Poster presentations. The minimum passing marks for each paper (Theory as well as practical) is 40%.

R4: CCH: MID TERM ADMISSIONS:

No admissions are permitted to candidates desirous of Mid Term transfers from other Universities, seeking admissions to 2nd to 4th Semesters.

R5: CCH: REGISTRATION:

If students those want to register themselves either in the semester-III or in the semester-V seeking degree shall have to register with the University by submission of a Migration Certificate from the University from where the Eligibility Examination has been cleared.

R6: CCH: SEMESTER EXAMINATIONS:

1. Candidates desirous of appearing at any Semester Examination shall have to submit applications in the prescribed form, through the designated authority on or before the prescribed date.
2. No candidate will be admitted to any Semester examination unless the Designated Authority i.e. the Head of the Department or Principal of the College certifies that:
 - (1) The candidate attended the course of study to the satisfaction of the designated authority.
 - (2) The candidate maintained a good conduct and character during the studies.
 - (3) The candidate maintained Minimum 80% attendance in each semester

R7: CCH: EVALUATIONS:

1. Each theory paper is evaluated for a maximum of 100 marks out of which, 30 marks shall be for Mid Term Exams. An end semester examination shall be of 3 hours duration carrying 70 marks to be held at the end of each semester.

Mid Term Result (30) = Score in midterm theory exam (40)/2 + assignment, seminar and attendance (10)

1. In Semesters I& II a practical examination will be conducted, for a maximum of 50 marks.
 2. In Semesters III & IV a practical examination will be conducted, for a maximum of 100 marks.
 3. In Semesters V & VI a practical examination will be conducted, for a maximum of 200 marks.
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1. The Mid Term paper shall comprise of question 1 with multiple choice questions or very short answer questions, each question carrying 1 mark and all of them should be answered (10 x 1=10 marks) plus question 2 with 7 short answer questions out of which 5 need to be answered, each question carrying 3 marks. The question 3 will have 5 descriptive questions out of which 3 should be answered, the question carrying 5 marks.
 2. The End Term paper for semester-I & II carrying 70 marks. Total 5 Questions Each Question carry 14 marks. First 4 question from each unit of the syllabus. While last question no. 5 will be 14 multiple choice questions or very short answer questions, each question carrying 1 mark and all of them should be answered (14 x 1=14 marks).
 3. The End Term paper for semester-III to V carrying 70 marks. Total 4 Questions Each Question carry 20 marks. First 3 question from each unit of the syllabus. While last question no. 4 will be 10 multiple choice questions or very short answer questions, each question carrying 1 mark and all of them should be answered (10 x 1=10 marks).
 4. The marks obtained by the students in all the theory papers in the Mid Term must be submitted to university before commencement of end term theory examination. Marks in all the theory papers and in practicals in End Term will be sent to “The Controller of Examinations, Kadi Sarva Vishwavidyalaya, Gandhinagar”, within a fortnight from the close of the Semester.
 5. Students shall have to appear in all the exams. Absence shall mean 0 Marks. An examination in which the candidate was absent/ failed, he/ she should re-appear. No candidate is allowed to re-appear for the Semester examinations already cleared.

- The results of the examinations will be declared usually within 30 working days after the final examination. For awarding the degree at the end of the course all the Mid Term and Final exams Cumulative Performance Index (CPI) are taken in to consideration.

R8: CCH: RULES FOR GRADING

- Theory Subjects and Practical Subjects are allotted credits as per the hours allocated to them per week. (i. e. 1 hr = 1 Credit = 25 Marks).
- To pass a subject in any Semester a candidate must obtain a minimum of 40% of marks under each head of the subject and minimum of 40% in the individual subject head.
- If a candidate fails in any heads of a subject, he has to reappear for that particular paper and pass. (That is, for example if candidate fails in midterm exam of a subject, he has to reappear for midterm of that subject.)
- The performance of each candidate in all the subjects will be evaluated on 7- point scale in term of grades as follow:

Grading Scheme		%age according to Grade	Grade Points	Qualitative Meaning of Grade
1	A +	90-100	10.0	Outstanding
2	A	80-89	9.0	Excellent
3	A-	70-79	8.0	Very Good
4	B +	60 - 69	7.0	Good
5	B	50-59	6.0	Average
6	B-	40-49	5.0	Fair
7	F	Less Than 40	0	Fail
8	I	Incomplete		

R9: CCH: PERFORMANCE INDEX:

The performance of a student in a semester is expressed in terms of the **Semester Performance Index (SPI)**.

A. SEMESTER PERFORMANCE INDEX (SPI)

The Semester Performance Index (SPI) is the weighted average of Course Grade Points obtained by the student in the semester. The Weights assigned to Course Grade Points are the Credits carried by the respective courses.

$$\begin{aligned}
 &g_1 c_1 + g_2 c_2 + \dots \\
 \text{SPI} = & \frac{\text{-----}}{c_1 + c_2 + \dots}
 \end{aligned}$$

Where, g_1, g_2, \dots are the Grade points obtained by the student in the Semester, for Courses carrying Credits c_1, c_2, \dots respectively.

The cumulative performance of a student at the end of the Semester / Course is expressed in terms of the **Cumulative Performance Index (CPI)**.

B. CUMULATIVE PERFORMANCE INDEX (CPI)

This index is defined as the weighted average of Course Grade Points obtained for all the weights for Theory Papers (Both Mid Term & End Term) and Practicals attempted since his admission to the program, where the weights are defined in the same way as in **Semester Performance Index (SPI)**.

If a failed student repeats a course, only the Grade Points obtained in the latest attempt shall be counted in the **Cumulative Performance Index**. Whenever the candidate clears the subject in the next semester examination, the total credits for that subject will be added to CPI.

For any Semester, the maximum marks for the Mid Term and End Term assessments are shown in the teaching and examination scheme. For the purpose of Mid Term assessment, tests, quizzes, assignments or any other suitable methods of assessment may be used by the department.

R10: CCH: SEMESTER PASSING SCHEME:

- a. For each semester examination, a candidate will be considered as pass if he/she has secured "B-" or above grade in all the subject (s) and overall grade point 5.00 or above.
- b. For each semester examination, a candidate will be considered as fail if he/she has secured "F" grade in any or all the subject (s).

- c. If the candidate does not fulfill the subject requirements including requisite attendance percentage, he/she will be given I grade and the candidate will have to complete the course requirements before the commencement of the next End Semester examination. If the candidate does not clear I grade in any subject before the commencement of the next End Semester examination, he/she will be considered fail - F grade.
- d. Candidate has to clear his / her 'F' grade or 'I' grade, if any, by the next End Semester examination.

R11: CCH: SEMESTER PROMOTION SCHEME:

A candidate will be promoted to the subsequent Semester according to the following scheme:

- a. A candidate would be granted admission to the Second Semester if and only if he/she has been granted Term for First Semester and has applied for the university examination.
- b. A candidate would be granted admission to the Third Semester if and only if he/she has been granted Term for First & Second Semesters and has applied for the university examination.
- c. A candidate would be granted admission to the Fourth Semester if and only if he/she has cleared all the subjects of First Semester. He /She will be permitted to pursue his/her study of Fourth Semester, provided his/her term for II & III Semesters is granted and has applied for the university examination.

Promotion Criteria for B. Sc. Mathematics

Semester	Condition(s) For Promotion
II	Grant of Term for Semester – I
III	Grant of Term for Semester I and Semester II
IV	Clearing of Semesters I completely and Grant of Term for Semester II & Semester III
V	Clearing of Semesters II completely and Grant of Term for Semester III & Semester V
VI	Clearing of Semesters III completely and Grant of Term for Semester IV & Semester V

R12: CCH: AWARD OF GRADING / DIVISION:

No class/ division will be awarded to the students in the first 3 semesters. Divisions shall be awarded only at the end of Final Examinations on successful completion of all the Semesters. For awarding the degree at the end of the course, Cumulative Performance Index (CPI) of all the Mid Term and Final exams shall be taken in to consideration as per the following pattern of **Cumulative Performance Index (CPI)**:

S.N.	CPI	Division
1	7.50 to 10.00	I Division with Distinction
2	6.50 to 7.49	I Division
3	6.00 to 6.49	II Division
4	5.00 to 5.99	Pass Division

R13: CCH: CRITERIA FOR AWARDING THE MARKS STATEMENT:

Following criteria would be followed for awarding the mark statement of any Semester:

The Grade (Mark) sheet will contain separate grades for each of compulsory papers (subjects), Practical work, Project Work and overall grade for all the subjects combined. SPI and CPI will be shown in each semester's Grade (mark) sheet for each end-semester examination. In the Final Semester, it will also contain percentage and the class obtained.

R14: CCH : EXAMPLES OF GRADE POINT CALCULATION

Subject wise Grades and grade points will be calculated based on the defined Grading Scheme. For example

FOR SEMESTER-I (Maths Group)

SUBJECTS	TOTAL MARKS (INT + EXT)	MARKS SECURED (INT + EXT)	%AGE	GRADE	GRADE POINTS	SUBJECT WISE CREDITS	CREDITS X GRADE POINTS (Total Credits)
CCH-101	100	75	75.00	A-	8	4	32
CPH-101	100	64	64.00	B+	7	4	28
CMAT-101	150	75	50.00	B	6	6	36
FCG-101	50	35	70.00	A-	8	2	16
EGC-101	50	40	80.00	A	9	2	18
ECH-101(A)	50	20	40.00	B-	5	2	10
PCH-101	50	40	80.00	A	9	2	18
PPH-101	50	45	90.00	A+	10	2	20
TOTAL						24	178

$$\text{SPI} : 178 / 24 = 7.41$$

$$\text{CPI} = 7.41$$

Semester – I

CCH-101 FUNDAMENTALS OF CHEMISTRY-1

RATIONALE: This course is designed to enable students to acquire basic understanding of the Chemical world, its origin and structure to help the potential application of the unexplored and unidentified chemicals in the industry.

LEARNING OUTCOMES:

- Understand the concept of origin of chemistry.
- Develop an understanding of the chemical systems around us.
- Gain knowledge about the structure, function and applications of various chemicals.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CCH- 101	Fundamentals of Chemistry-1	4	48	30	70	100

COURSE CONTENT

Number of lectures: 12	Weightage: 35%
Unit 1:	
(a) Chemical Bonding	
• Valence bond theory & its application	
• Directional characteristics of covalent bond	
• Various types of hybridization and shape of simple inorganic molecules	
• V.S.E.P.R. theory for NH ₃ , H ₂ O	
• M.O. Theory-Energy level diagram for homo nucleus diatomic molecules (N ₂ and O ₂) and hetero diatomic molecule (CO and NO)	
(b) F-Block Elements	
• Lanthanide electronic configuration, Oxidation state	
• Lanthanide contraction, Effect of lanthanide contraction	
• Separation method	
(1) Solvent extraction methods	
(2) Ion Exchange Method	

Number of lectures: 12

Weightage: 35%

Unit 2

(a) Structure And Properties

- Factors affecting to the properties of organic molecule
- Intramolecular forces (dipol-dipol interaction, vander waals forces)
- Electromeric effect
- Inductive effect
- Resonance effect(draw resonating structures of Nitro benzene, Chlorobenzen, Phenoxide ion, Anillinium ion, Acetate ion)
- Hyper conjugation (o,p-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals)

(b) Reaction Mechanism

- Fission of Co-Valent bond (With atleast one example of each intermediates)
- Types of reagents.
- Types of organic reaction with mechanism.
- Substitution reactions (Nucleophilic & Electrophilic)
- Addition reactions (Nucleophilic & Electrophilic)
- Elimination reactions (E₁ & E₂)

Number of lectures: 12

Weightage: 35%

Unit 3

Thermodynamics

- Thermodynamics (only introduction)
- System and surrounding- work & heat, state function, thermodynamic process, internal energy, enthalpy, free energy, maximum work function.
- First law of thermodynamics
- Heat capacity, specific and molar heat capacity, heat capacity at constant volume and pressure and their relationship
- Work done in adiabatic and isothermal reversible expansion of an ideal gas.
- Second law of thermodynamics
- Carnot cycle and its efficiency
- Concept of entropy ; entropy change for an ideal gas under different conditions, entropy change for mixture of ideal gases
- Gibbs-Helmholtz equation, Numericals

Number of lectures: 12

Weightage: 35%

Unit 4

Analytical Chemistry

- Introduction to Analytical Chemistry
 - Classification of Classical and Electroanalytical Techniques.
 - Literature of Analytical Chemistry (Names of Author and Publishers for Any Ten Books, Journals and Reviews)
 - Criterion for Selection of analytical Techniques.
 - Analytical Data Treatment
- Error, Types of errors, Accuracy and Precision. Statistical Terms : Mode, Average, Median, Deviation, Average Deviation, Relative Average Deviation, Standard Deviation & Coefficient of variance.
- Q-Test for the rejection of result and related numericals

REFERENCES:

1. 'Concise Inorganic Chemistry' J.D.Lee, 5 th edn.
2. Text book of Organic Chemistry, Arun Bahal, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Analytical Chemistry, Garry D.Christain.

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & Discussing the major terminologies related to Microbiology
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	35	12
Unit 2	35	12
Unit 3	15	12
Unit 4	15	12
Total	100	48

Semester I
Practical- PCH 101

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the chemical world, its origin and structure to help the potential application of the unexplored and unidentified compounds in the industry. These practicals make the students capable and competent to work in chemistry related industries.

LEARNING OUTCOMES:

- Understand the concept of origin of chemistry.
- Develop an understanding of the chemical properties of compounds.
- Gain knowledge about the structure, function and applications of the chemicals compounds.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyze the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PCH- 101	Chemistry Practical- 1	2	6 (6 hrs & 1 Day)	50	50

LIST OF EXPERIMENTS

1. Inorganic Chemistry

Semi micro Analysis:-

- Cation analysis; separation and identification of ions from group I, II, III-A, III-B, IV, V-A, V-B.
- Anion analysis like Cl⁻, Br⁻, I⁻, NO₃⁻, NO₂⁻, SO₄²⁻, SO₃²⁻, S²⁻, CO₃²⁻, CrO₄²⁻ (Water Soluble and insoluble).
- Candidate should perform the analysis of at least 10 compounds.

2. Standardization

- 1) Preparation of standard solution of succinic acid and standardization of NaOH/KOH solution.
- 2) Preparation of standard solution of Na₂S₂O₃ and standardization of I₂ solution.
- 3) Preparation of standard solution of EDTA and estimation of Ca⁺²/Mg⁺² in CaCl₂/MgCl₂ solution.
- 4) Preparation of standard solution of Oxalic acid and standardization of KMnO₄ solution.
- 5) Preparation of standard solution of K₂Cr₂O₇ and standardization of FeSO₄ solution.

3. Demonstrations

- Preparation of standard stock solution by w/v method and their different dilutions.
- Preparation of standard stock solution of HCl by v/v method and their different dilutions.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

Physics

Course Description: This course is designed to enable students to acquire understanding of fundamentals of Physics. The course is aimed at providing practical training on handling various scientific instruments and is intended to enable students carry simple experiments in laboratories.

COURSE STRUCTURE:

Year	Semester	Paper	Paper Name	Theory Marks	Experiment Marks	Total Marks
B.Sc I	I	CPH-101	Introduction to General Physics	100	50	150
	II	CPH-201	Fundamentals of Physics	100	50	150
B.Sc II	III	CPH-301	Basic Physics-I	100	100	300
		CPH-302	Basic Physics-II	100		
	IV	CPH-401	Basic Physics – III	100	100	300
		CPH-402	Basic Physics – IV	100		

Semester I
CPH-101 Introduction to General Physics

RATIONALE: This course is designed to enable students to acquire basic understanding of the Physical world, its origin and structure to help the potential application of the unexplored and unidentified organisms in the industry.

LEARNING OUTCOMES:

- Understand the concept of origin of Physical Science.
- Develop a concrete understanding of the Physical systems around us.
- Gain knowledge about the various laws of nature, new frontier of physics with potential applications in our day by day life.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 101	Introduction to General Physics	4	48	30	70	100

COURSE CONTENT

<p>Number of lectures: 12 Weightage: 25%</p> <p>Unit 1:</p> <p>(a) Vector analysis:</p> <ul style="list-style-type: none"> • Triple Products of Vectors, Scalar Triple Product, Some Important Conclusions from Scalar Triple Product , The Vector Triple Product $A \times (B \times C)$ • Differentiation of a Vector with Respect to time, Scalar and Vector Fields, Partial Differentiation and Gradient, Operations with ∇, The rate of Flow of flux of a Vector Field, • Vector Integration, Surface Integral, Gauss's Divergence Theorem, Stoke's Theorem, Derivation of Green's Theorem from Gauss Divergence theorem <p>(b) Simple Harmonic Motion and Damped Vibration</p> <ul style="list-style-type: none"> • Composition of Two Simple Harmonic Motions along the same direction of the same frequency, Composition of two simple harmonic motions acting upon a particle simultaneously at right angles to each other, same time period but different in phase, Motion in a resisting medium

Number of lectures: 12 Weightage: 25%

Unit 2

(a) D.C. Circuits:

- Simple R-L Circuit - Growth and Decay of Current Helmholtz equation, R-C Circuit
- Measurement of high resistance by method of leakage, Comparison of capacities by De Sauty's Method
- Ideal L-C. Circuit, Series LCR Circuit (for charge case only)

(b) Network Theorems:

- Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Theorem

Number of lectures: 12

Weightage: 25%

Unit 3

(a) Heat and Thermodynamics:

- Second Law of Thermodynamics, Carnot's Theorem, Thermodynamic Scale of Temperature, Identity of Perfect Gas Scale and Absolute Scale, Thermodynamics of Refrigeration

(b) Entropy:

- Entropy, Change of Entropy in a Reversible process, Change of Entropy in an Irreversible process, Principle of increase of entropy or degradation of energy, Formulation of the second law in terms of entropy, Entropy and Second Law

Number of lectures: 12

Weightage: 25%

Unit 4

(a) Rectifier and filter circuits:

- The Half Wave Rectifier, Voltage regulation, Ripple factor, Ratio of Rectifications, Transformer utilization factor
- The Full Wave Rectifier, The Bridge Rectifier, The Inductor filter, The Capacitor filter, Ripple factor, The Choke input filter, Ripple factor in LC filter, Value of Critical inductance, The CLC filter

(b) Transistors:

- Review of Construction of transistor, Transistor current components, Detailed Transistor Leakage currents, C-B Configuration static characteristics, Load line, Operating point

REFERENCES:

1. Electricity and Magnetism By K.K. Tewari (S.Chand& Company Ltd.)
2. Mathematical methods in physical sciences By M.L.Boas (John Willey & Sons)
3. Waves And Oscillations By N. Subrahmanyam&BrijLal (Vikas Publishing House Pvt Ltd., New Delhi)
4. Thermodynamics and statistical Physics By Singhal, Agarwal and Prakash (PragatiPrakashan, Meerut)
5. University Physics By Sears, Zeemansky and Young (Narosa Publishing House)
6. Heat and Thermodynamics By Richard H. Dittmon, & Mark W.Zemansky (TMH)
7. Electronic Devices & Circuits by Allen Mottershead (PHI Pvt.Ltd)
8. Hand Book of Electronics by Gupta & Kumar (PragatiPrakashan, Meerut-Revised addition)
9. Basic Electronics and Linear circuits by BhargvaKulshreshth& Gupta TMH Edition
10. Elements of Electronics by Bagde& Singh
11. Fundamentals of Physics by Haliday, Resnik, Walker (Wiley-India Edition)
12. Basic Electronics and linear circuits by Bhargava,Kulshreshtha and Gupta (TMH)

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & Discussing the major terminologies related to Physics
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	12
Unit 2	25	12
Unit 3	25	12
Unit 4	25	12
Total	100	48

Semester I
Physics Practical I - PPH 101

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes.

LEARNING OUTCOMES:

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyze the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PPH- 101	Physics practical –I	2	6 (6 hrs& 1 Day)	50	50

LIST OF EXPERIMENTS (Any Twelve)

1. Damping coefficient, Relaxation and quality factor in the damped motion of a simple Pendulum.
2. Momentum of Inertia of a Fly wheel.
3. Verification of Steafan’s law using A.C.Source.
4. Arrangement of Spectrometer for parallel rays using Schuster method and calibration of spectrometer.
5. Refractive index of liquid using convex lens.
6. Study of Resonator.
7. To determine the magnetic moment of a given Bar magnet using deflection magnetometer in Gauss A and B position.
8. Determination of the capacity ‘c’ of condenser.
9. Study of the series resonance with frequency variation.
10. Decay of Potential across condenser.
11. P-N Junction diode as Half Wave Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.
12. V-I characteristics of Zener diode and its use as Voltage regulator.
13. Verification of Thevenin’s theorem.
14. Characteristics of common Emitter Transistor.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

Mathematics

Programme	Semester	Paper	Paper Name	Marks
B.Sc	I	CMAT-101	Mathematics - I	150
	II	CMAT-201	Mathematics - II	150

Semester I CMAT 101- Mathematics I

Rationale:

This course is designed to enable students to acquire the understanding and practice the applications of Calculus, Vector Analysis and three dimensional Geometry.

Learning Outcome:

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

- Find the n^{th} derivative of a function as well as the n^{th} derivative of the product of two functions.
- Practice the applications of definite integrals for (a) summation of the series (b) find the surface area and volume.
- Know about gradient, divergent and curl
- Relation between Polar, Spherical and cylinder coordinates and Geometrical importance of sphere, cone, cylinder and conicoids.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 45 marks and End Term Examination conducted by University examination for 105 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 101	Mathematics-I	6	72	45	105	150

COURSE CONTENT

Number of lectures: 18	Weightage: 25%
Unit-1 : Successive differentiation:	
Successive Derivatives, Some standard results for n^{th} derivatives, Leibnitz's Theorem and its examples. Cauchy's Mean Value Theorem.	
Taylor's Therom (without proof),Maclaurians series and its examples. Expansion of power series of $\sin x$, $\cos x$, e^x .	

Number of lectures: 18

Weightage: 25%

Unit-2 : Integration

Reduction formula $\int_0^{\pi/2} \sin^n \theta d\theta, \int_0^{\pi/2} \cos^n \theta d\theta, \int_0^{\pi/2} \sin^m \theta \cos^n \theta d\theta, m, n \in \mathbb{N}$.

Application of definite integrals to (a) Summation of the series (b) Rectification
(c) Surface and volume revolution.

Number of lectures: 18

Weightage: 25%

Unit-III : Vector Analysis

(a) Vector analysis : scalar and vector product of three vectors, product of four vectors, reciprocal vectors, vector differentiation, gradient, divergent and curl.
(b) Polar co-ordinates, spherical and cylinder coordinates and their relations.

Number of lectures: 18

Weightage: 25%

Unit-IV : Sphere, Cone and Cylinder and introduction to Conicoids:

(a) **Sphere:** plane section of sphere, intersection of two sphere, intersection of sphere and line, power at a point, tangent plane and normal. Plane of contact, angle of intersection of two spheres, condition of orthogonality.

(b) **Cone and cylinder:**

Definition of cone, vertex, guiding curve, generators, equation of a cone with a given vertex and a guiding curve, right circular cone with given vertex, axis and semi vertical angle.

Definition of a cylinder, equation of a cylinder whose generators intersect a given cone and are parallel to a given line, equation of a right circular cylinder.

(c) Conicoid: Standard equation of ellipsoid, hyperboloid of one and two sheets, Elliptic paraboloid and hyperbolic paraboloid.

REFERENCES:

1. Differential Calculus, by Shantinayakan.
2. Integral Calculus, by Shantinayakan.
3. Vector Analysis, by Murry R. Spiegel.
4. Vector Analysis, by Dr.K.S.Rawat, SARUP & SONS, DELHI
5. Introduction to Vector Analysis, Fifth Edition, by Herry F. Davis, Arther David Saider
6. Analytic Geometry and Calculus by Gordon Fuller & Robert M. Parker.
7. Analytic Geometry by Gordon Fuller (5th edition) (Addison-Wesley).
8. Analytic Geometry of two and three dimensions, Second Editions, by Hema Vasavada, Vallabh Vidyanagar, 1998.
9. Analytic Solid Geometry by Shantinayakan (S. Chand & Co.)
10. Coordinate Geometry by P. Balasubramanyam, K.G. Subramaniam and G.R. Venkatraman (Tata Mc Graw Hill Publ. Co.)
11. College Mathematics-CCMAT101, Nirav Prakashan

INSTRUCTION STRATEGIES

1. Interactions with the students to judge the subject-understanding of students
2. Explaining & Discussing the major terminologies and formulae related to the course
3. Use of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	18
Unit 2	25	18
Unit 3	25	18
Unit 4	25	18
Total	100	72

FCG 101- Basic English - 1

RATIONALE: This course is designed to enable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

LEARNING OUTCOMES:

- Understand the functions and usage of tense, articles and primary auxiliary.
- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms out of alternative choices, joining clauses, sentences as directed, replacing indicated sections with single word / opposite / synonyms etc.
- Acquire interest in English language and literature through textbook lessons.
- Acquire additional vocabulary as prescribed in the textbook.
- Comprehend the basic language structure through reading paragraph and answering the questions based on it.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				MidTerm	End Term	
FCG - 101	Basic English - 1	2	24	15	35	50

COURSE CONTENT

Number of lectures: 8	Weightage: 30%
Unit 1: Lesson 1 to 5	
‘Fantasy’ -a collection of short stories edited by V. Sasikumar(Orient Black Swan)	

Number of lectures: 4	Weightage: 20%
Unit 2	
Vocabulary (Text based)	

Number of lectures: 8	Weightage: 30%
Unit 3	
English Grammar	
• Tenses	
• Primary Auxiliaries	
• Articles	

EGC 101- Communication Skills – 1

RATIONALE: This course is designed to enable students to acquire basic understanding of Phonetics. The students would be made familiar with the stress, punctuation and fluency of English words and sounds. The course would help students to know the sentence patterns and grammatical structures.

LEARNING OUTCOMES:

- To enable the student to pronounce correctly with proper stress and intonation, to use the conversational structure appropriately.
- To describe and characterise spoken English both from the grammatical and the discourse perspectives.
- To describe guidelines and identify the difficulties Indian students and users of English as a foreign language have in the use of the English language in oral contexts.
- To draw comparisons between oral and written language through the use of representative oral and written language.

TEACHING AND EVALUATION SCHEME:

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credit	Theory			Total Marks
			Hrs.	MaxMarks		
				Mid Term	End Term	
EGC 101	Communication Skills-1	2	24	15	35	50

COURSE CONTENT

Section A

Number of lectures: 12 Weightage: 50%

Unit – I Basics of Phonetics:

- (a) Communication- English Sounds, Words and Language
- (b) Stress, Punctuation and Fluency
- (c) Intonation and Pronunciation

Section-B

Number of lectures: 12 Weightage: 50%

Unit – II Conversational Structures :

- (a) Dialogue-based study of structure patterns and grammatical topics
- (b) Common errors in using English language

RECOMMENDED READING :

1. V. Sasikumar : A Course in Listening and Speaking – I, Cambridge Uni. Press
2. G. Taylor: English Conversation Practice, Tata Mcgraw-Hill Publishing Co. Ltd.
3. Wrenn & Martin: High School English Grammar & Composition, S, Chand Pub.

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students.
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point Presentation), Notes, References, Copy of Articles, Models, Diagrams

TEACHING AND EXAMINATION

UNIT	Examination Scheme % Weightage	Teaching Scheme No. of Lecture
UNIT 1	50	12
UNIT 2	50	12

Subject Elective

Set Theory & Functions

Paper: EMAT - 101

RATIONALE: This course is designed to enable students to acquire understanding about the fundamentals of set theory and functions.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EMAT- 101	Set Theory & Functions	2	24	00	50	50

COURSE CONTENT

Unit-I

Number of lectures: 12

Weightage: 50%

Set Theory: Sets and subsets , Basic set operations , Sets of numbers ,Product sets , Indexed sets, Union and intersection of indexed collections , Principle of duality , Bounded and unbounded sets.

Unit-II

Number of lectures: 12

Weightage: 50%

Functions : Definitions, Operators , transformations , Range , one-one functions , onto functions, identity functions, constant functions, composition of functions (product of functions), Inverse of functions, Set functions, Real valued functions, algebra of real valued functions , characteristic functions .

REFERENCES:

1. Set Theory & Related Topics, Seymour Lipschutz McGraw-Hill book Company , Singapur
2. Business Mathematics, D.C. Sancheti & V.K. Kapoor, Publication : S Chand & sons, New Delhi.

INSTRUCTION STRATEGIES

1. Interactions with the students to judge the subject-understanding of students
2. Explaining & Discussing the major terminologies and formulae related to the course
3. Use of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Semester –II

Part/Class	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem-II B.Sc. (Mathematics)		Semester II					
	CCH-201	Fundamentals of Chemistry-II	4	30	70	100	4
	PCH-201	Chemistry Practicals-II	4		50	50	2
	CPH-201	Fundamental of Physics	4	30	70	100	4
	PPH-201	Physics practical II	4		50	50	2
	CMAT-201	Mathematics-II	6	45	105	150	6
	FCG-201	Basic English-II	2	15	35	50	2
	EGC-201	Communication Skills-II	2		50	50	2
	EMAT-201	Industrial Mathematics- I	2		50	50	2
				28	120	480	600

CCH 201-Fundamentals of Chemistry- II

RATIONALE: This course is designed to enable students to acquire basic understanding of the chemical technology.

LEARNING OUTCOMES:

- Understand the concept of chemical sciences.
- Develop an understanding of the chemicals and its effects.
- Gain knowledge about the chemistry existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CCH- 201	Fundamentals of Chemistry II	4	48	30	70	100

COURSE CONTENT

Number of lectures: 12	Weightage: 35%
Unit 1:	
(a) Coordination Compounds	
• Definition	
• Nomenclature of Complex.	
• Werner's theory and its experimental verification.	
• Concept of Effective Atomic Numbers (E.A.N.) for Coordination Compounds.	
• Limitations of Valence bond theory of transition metal Complexes.	
• An Elementary idea of (C.F.T.) Crystal field splitting of d-orbital in Oh and Td.	
• Factors affecting to the crystal field splitting.	
• Application of common complexes & chelates.	
(b) Actinide	
• Electronic Configuration.	
• Oxidation state.	
• Synthesis of Plutonium	

Number of lectures: 12

Weightage: 35%

Unit 2

Stereo Chemistry Of Organic Compounds

Introduction of Stereo Isomers;

• Optical isomerism :

General, Discussion of elements of symmetry, Molecular chirality, Enantiomers, Optical activity, Properties of enantiomers, Chiral and a chiral molecules with two stereogenic centers, Diastereomers, Threo and Erythro diastereomers, Meso compounds.

• Geometrical isomerism:

Definition and general discussion of geometric isomers, General methods of structure determination (physical methods), E-Z nomenclature (Simple illustration should be given).

• Conformational isomerism:

Definition, Conformational analysis of ethane, n-butane with rotational and torsional diagram, Conformation of cyclo hexane, Axial and equatorial bonds, Newmann projection, Show horse formula, Fisher & flying wedge formula, Difference between conformation and configuration.

Number of lectures: 12

Weightage: 35%

Unit 3

(a) Chemical Kinetics

- Introduction of following terms.
- Rate of reaction, Order of reaction, Molecularity.
- Rate equation for second order reaction. (a=b) & (a b).
- Characteristics of second order reaction.
- Rate equation for third order reaction.
- Characteristics of third order reaction.
- Numerical.

(b) Nuclear Chemistry

- Concept of Nuclear particle.
- Definition of Isotopes, Isotones, Isobars, Isomers.
- Packing fraction.
- Nuclear binding energy.
- Nuclear coulomb barrier.
- Rate of radio active disintegration, half life period, Average life period.
- Rutherford & Soddy's law (Group transfer law)
- Numerical.

Number of lectures: 12

Weightage: 35%

Unit 4

Principle, Mechanism and Applications of,

- Acid-Base Titrations (Only strong acid Vs strong Base).
- Redox Titrations (Only Fe(II) vs KMnO_4)
- Complexometric Titrations (Only $\text{Ca}^{+2}/\text{Mg}^{+2}$ vs EDTA)
- Precipitation Titrations (Only Cl^- vs AgNO_3).
- Related Numericals. quaternary ammonium compounds, aldehydes and gaseous chemosterilizers.
- Evaluation of antimicrobial potency of disinfectants and antiseptics- Tube dilution, Agar diffusion. Phenol coefficient.

REFERENCES:

1. 'Concise Inorganic Chemistry' J.D.Lee, 5 th edn.
2. Text book of Organic Chemistry, Arun Bahal, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Analytical Chemistry, Garry D.Christain

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & Discussing the major terminologies related to Microbiology
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	35	12
Unit 2	35	12
Unit 3	15	12
Unit 4	15	12
Total	100	48

Semester II
Practical- PCH 201

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the chemical world, its origin and structure to help the potential application of the unexplored and unidentified compounds in the industry. These practicals make the students capable and competent to work in chemistry related industries.

LEARNING OUTCOMES:

- Understand the concept of origin of chemistry.
- Develop an understanding of the chemical properties of compounds.
- Gain knowledge about the structure, function and applications of the chemicals compounds.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyze the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PCH- 201	Chemistry Practical II	2	6 (6 hrs &1 Day)	50	50

LIST OF EXPERIMENTS LIST OF EXPERIMENTS

1. Organic Chemistry

- 1) Identification of an organic compound through the functional group analysis, Determination of melting point and boiling point, Preparation of suitable derivative.
- 2) Candidate should perform the analysis of at least 10 compounds.

List of compounds

✓ **Acids:**

Benzoic acid, Cinnamic acid, Phthalic acid, Oxalic acid, Succinic acid.

✓ **Phenols:**

α Naphthol, β Naphthol.

✓ **Bases:**

p-Toludine, Diphenylamine, Aniline, Methyl aniline.

✓ **Neutrals:**

Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, m-Dinitrobenzene, Urea, Thiourea, Toluene, Acetone, Benzaldehyde, Methyl acetate, Ethyl acetate, Ethanol, 1-Propanol, Glycerol, Chloroform, Carbon tetrachloride, Chlorobenzene, Nitrobenzene.

2. Volumetric Titrations

- 1) To determine the strength of NaOH and Na₂CO₃ present in the solution mixture of NaOH & Na₂CO₃ and to find out their percentage composition.
- 2) To determine the strength of NaHCO₃ and Na₂CO₃ present in the solution mixture of NaHCO₃ & Na₂CO₃ and to find out their percentage composition.
- 3) To determine the Normality, gram/liter and molarities of H₂C₂O₄, 2H₂O and H₂SO₄ present in the solution mixture of H₂C₂O₄, 2H₂O & H₂SO₄ by using X N NaOH and Y N KMnO₄ solutions.

4) To determine the Normality, gram/liter and molarity of $\text{H}_2\text{C}_2\text{O}_4$, $2\text{H}_2\text{O}$ and $\text{K}_2\text{C}_2\text{O}_4$ present in the solution mixture of $\text{H}_2\text{C}_2\text{O}_4$, $2\text{H}_2\text{O}$ & $\text{K}_2\text{C}_2\text{O}_4$ by using $X \text{ N NaOH}$ and $Y \text{ N KMnO}_4$ solutions.

5) To determine the amount of Ca^{+2} and Mg^{+2} ion by EDTA solution from the mixture solution of CaCl_2 and MgCl_2 .

3. Demonstrations

- ✓ Melting point and Boiling point of an organic compound.
- ✓ Calibration of burette and Pipette.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

Semester II

CPH 201- Fundamentals of Physics

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 201	Fundamentals of Physics	4	48	30	70	100

COURSE CONTENT

Number of lectures: 12	Weightage: 25%
Unit – I	
<ul style="list-style-type: none"> • Mechanics of a single particle & of particles: Motion of a particle subjected to a resistive force , mechanics of a system of particle, Motion of a system with variable mass • (b) Motion in a central force field & Pendulum: Equivalent one body problem, Motion in central force field, General features of the motion, Motion in an inverse square law force field, Equation of the orbit. Kapler’s law of planetary motion, Compound Pendulum, Bar-Pendulum 	

Number of lectures: 12	Weightage: 25%
Unit 2	
<p>a) Refraction Through Lenses:</p> <ul style="list-style-type: none"> • Principal Foci, Least possible distance between an object & its real image in a convex lens, Derivation produced by a thin lens, Equivalent Focal Length of Two Thin Lenses Separated by a Finite Distance, Cardinal Points of an Optical system, Principal Foci and Focal Planes, Principal Points and Principal Planes, Nodal Points, Aberrations, Spherical aberration in a Lens, Chromatic aberration. <p>b) Interference:</p> <ul style="list-style-type: none"> • Interference in thin films , Interference due to reflected light, Interference due 	

to transmitted light, Newton's Rings, Determination of the wavelength of sodium light using Newton's Rings, Refractive Index of a Liquid using Newton's Rings

Number of lectures: 12

Weightage: 25%

Unit 3

a) Electrostatics:

- a. Gauss's Law, Gauss's Law in Differential Form, Gauss's Law and Coulomb's Law, Force on The surface of a charged Conductor, Electrostatic Energy in the medium surrounding the charged conductor, Millikan's Oil drop Method for Determination of Electronic charge

b) Steady Current:

- b. Current and current density, Conservation of Charge i.e., Continuity Equation, Ohm's Law at a Point, Wiedmann and Franz Law, The Relaxation Time.

Number of lectures: 12

Weightage: 25%

Unit 4

a) Waves:

- c. Theory of Resonator, Dependence of the Frequency of Resonator on the size and the Shape of the Mouth, Velocity of Transverse Waves along a Stretched String, Laws of Transverse Vibration of Strings, Melde's Experiment, Kundt's Tube

b) Ultrasonic waves:

- d. Ultrasonic, Production of Ultrasonic Waves, Piezo-Electric Oscillator, Detection of Ultrasonic Waves, Applications of Ultrasonic waves

REFERENCES:

5. Elements of Properties of Matter By D.S.Mathur (S.Chand& Company Ltd.) Text book of Organic Chemistry, Arun Bahal, S.Chand.
6. Mechanics & Electrodynamics By Brijlal, N.Subrahmanyam & Jiva Seshan-(S.Chand& Co.)
7. Classical Mechanics by Goldstain (Narosa Pub.)
8. A Textbook of OPTICS By N.Subrahmanyam & BrijLal (S.Chand& Company Ltd.)
9. Optics and Atomic Physics By D.P.Khandelval (Himalaya publishing house)
10. Principles of Optics By B.K. Mathur (S.Chand& Company Ltd.)
11. Optics By Ajoy Ghatak (TMH Edition)
12. Electricity and Magnetism By K.K.Tewari (S.Chand& Company Ltd.)
13. Electricity and Magnetism by Mahajan and Rangwala.
14. Electricity and Magnetism - Berkley Physics Course Vol-II
15. Waves and Oscillations By N. Subrahmanyam and BrijLal (Vikas Publishing House Pvt.Ltd., New Delhi) – Second Revised Edition
16. University Physics By Sears, Zeemansky and Young(Narosa Publishing House)
17. A Text Book on Ocillations, Waves and Acoustics By M.Ghosh & D.Bhattacharya (S.Chand)
18. Vibration, Waves & Heat By Sears and Zeemansky

INSTRUCTION STRATEGIES

5. Interactions with the students to understand the level of students
6. Explaining & Discussing the major terminologies related to Microbiology
7. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
8. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	12
Unit 2	25	12
Unit 3	25	12
Unit 4	25	12
Total	100	48

Semester II
Physics Practical- II PPH 201

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes

LEARNING OUTCOMES:

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyse the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PPH- 201	Physics Practical-II	2	6 (6 hrs& 1 Day)	50	50

LIST OF EXPERIMENTS LIST OF EXPERIMENTS

1. Bar Pendulum: Determination of 'K' and 'g'
2. Double Refraction by Calcite prism.
3. Newton's rings: Determination of R and λ using sodium light.
4. Melde's Experiment.
5. Find out Refractive index of prism using spectrometer.
6. Study of line spectra.
7. To determine the ratio of magnetic moments of two magnets by using vibrational magnetometer.
8. Determination of self-inductance 'L' of Inductor.
9. Study of parallel resonance with frequency variation.
10. Study of transformer.
11. P-N Junction diode as Full Wave Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.
12. Bridge Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.
13. Verification of Maximum power transfer theorem.
14. Basic Logic Gates AND,OR , NOT

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

Semester II
CMAT 201 Mathematics-II

Rationale :

This course is designed to enable students to acquire the understanding and practice the applications of Complex number, De Moivre's theorem, differential equations and matrices.

Learning Outcome :

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

- Find the roots of a complex number, expansions of $\sin^n \Theta$, $\cos^n \Theta$ in terms of sine and cosine multiples of Θ .
- Applications of matrices
- Practice the applications of differential equations in real life situations.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 45 marks and End Term Examination conducted by University examination for 105 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 201	Mathematics-II	6	72	45	105	150

COURSE CONTENT

Number of lectures: 18	Weightage: 25%
Unit-I : De' Morve's theorem and its applications	
(a) Roots of a complex number	
(b) Application of Expansion of $\sin^n \theta, \cos^n \theta$, $n \in \mathbb{N}$ in terms of sine and cosine of multiples of θ .	
(c) Expansion of $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ in terms of sine, cosine and tangent. Respectively	

Number of lectures: 18	Weightage: 25%
Unit-II : More Applications on De' Morve's theorem	
(a) Exponential, Circular and hyperbolic function, Logarithmic and inverse functions.	
(b) Sequence and series: Definition of sequence, series. Definition of convergence of sequence and series, partial sum, comparison test, ratio test, root test and its examples.	

Number of lectures: 18	Weightage: 25%
Unit-III : Differential Equations	
(a) Linear differential equation $\frac{dy}{dx} + Py = Q$, P and Q are functions of x, Bernoulli's differential equation. (b) Differential equation of first order and higher degree solvable for s, solvable for	

y, solvable for $P = \frac{dy}{dx}$.

(c) Solution of Clairaut's and Lagrange's differential equation.

(d) Linear differential equation with constant coefficients.

Number of lectures: 18

Weightage: 25%

Unit-IV : Matrices

Introduction of matrices, different types of matrices, operations on matrices, theorems on matrices, Symmetric and skew -symmetric matrices, Hermitian and skew-

Hermitian matrices, linear dependence and independence of row and column matrices. Row rank, Column rank and rank of matrix, Row reduced Echelon form of a matrix and matrix inversion using it.

REFERENCES:

1. Complex Variables and Application, by Ruel V. Churchill & James Ward Brown, McGraw-Hill Publishing Company, New Delhi.
2. Complex Analysis, by J.V.DESHPANDE, Tata McGRAW-Hill Publishing Co. Ltd. New Delhi
3. Theory of Matrices, by B.S.Vatssa, 2nd Edition, Wiley Easterns Ltd
4. Matrix Operations, by Schaum's Series McGRAW-HILL Book Co.
5. Advanced Engineering Mathematics, Fifth Ed.- Kreyszig E. [New Age International Publishing Co.]
6. Higher Engineering Mathematics, Thirty-fifth edition. Grewal, B.S. [KhannaPubl]
7. College mathematics-CCMAT-201, Nirav Prakashan

INSTRUCTION STRATEGIES

1. Interactions with the students to gauge the subject-understanding of students
2. Explaining & Discussing the major terminologies and formulae related to the course
3. Use of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	18
Unit 2	25	18
Unit 3	25	18
Unit 4	25	18
Total	100	72

Semester II

FCG 102-Basic English - 2

RATIONALE: This course is designed to enable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

LEARNING OUTCOMES:

- Understand the functions and usage of preposition, subject-verb agreement and pronouns.
- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms out of alternative choices, joining clauses, sentences as directed, replacing indicated sections with single word / opposite / synonyms etc.
- Acquire interest in English language and literature through textbook lessons.
- Acquire additional vocabulary as prescribed in the textbook.
- Develop the skill of writing on various topics.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs	Max Marks		
				MidTerm	End Term	
FCG- 102	Basic English - 2	2	24	15	35	50

COURSE CONTENT

Number of lectures: 8 Unit 1: Lesson 6 to 10 ‘Fantasy’ -a collection of short stories edited by V. Sasikumar (Orient Black Swan)	Weightage: 30%
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Number of lectures: 4 Unit 2 Vocabulary (Text based)	Weightage: 20%
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Number of lectures: 8 Unit 3 English Grammar <ul style="list-style-type: none"> • Preposition (Time / Place / Action) • Concord (Subject-verb agreement) • Pronouns 	Weightage: 30%
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Number of lectures: 4
Composition (Paragraph Writing)

Weightage: 20%

REFERENCES:

1. High School English Grammar – Wrenn & Martin
2. Contemporary English Grammar – David Green
3. A Practical English Grammar - Thomson and Martinet

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	33	8
Unit 2	17	4
Unit 3	33	8
Unit 4	17	4
Total	100	24

Semester II
EGC102- Communication Skills-2

RATIONALE:

This course is designed to enable students to acquire basic understanding of Phonetics. The students would be made familiar with the stress, punctuation and fluency of English words and sounds. The course would help students to know the sentence patterns and grammatical structures.

LEARNING OUTCOMES :

- (1) To enable the student to initialize communication.
- (2) To facilitate the student to communicate verbally using elementary English.

TEACHING AND EVALUATION SCHEME:

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credit	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EGC 102	Communication Skills-2	2	24	15	35	50

COURSE CONTENT

<u>Section A</u>	
Number of lectures: 12	Weightage: 50%
Unit –I Communicating with others:	
(a) Meeting people, exchanging greetings and taking leave	
(b) Introducing oneself, Introducing people to others	
(c) Giving personal information	
(d) Talking about people, animals and places	

Section-B

Number of lectures: 12

Weightage:50%

Unit –II Active Conversation:

- (a) Answering the telephone and asking for someone
- (b) Taking and leaving messages
- (c) Making inquiries on phone
- (d) Calling for helping emergency
- (e) Talks, Debates, Speeches on different topics
- (g) Situation-based dialogues and conversation

RECOMMENDED READING :

1. V. Sasikumar : A Course in Listening and Speaking–I, Cambridge Uni. Press
2. Di Pietro: Speaking, Oxford: Oxford University Press
3. K. Sadanand & S.Punitha :A Foundation Course in Spoken English, Orient Longman

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students.
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD(Power point presentation), Notes, References, Copy of Articles, Models, Diagrams

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No.of Lecture
Unit1	50	12
Unit2	50	12

Subjective Elective

Industrial Mathematics- I

Paper: EMAT- 201

RATIONALE: This course is designed to enable students to acquire understanding about development and measurement of some basic instruments

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EMAT- 201	Industrial Mathematics-I	2	24	00	50	50

COURSE CONTENT

Unit-I Number of lectures: 12 Weightage: 50% (i) Introduction to Operations Research, Features of OR, Operations Research approach to Problem solving, Modeling in OR, Methods for solving OR Models. (ii) Introduction to game theory, Two-person zero sum theory, Pure strategies (Minmax and Maxmin principles), Mix strategies, Game with saddle point, Rules to determine saddle point, Game without saddle point, Dominance principles solution of $n \times 2$ and $2 \times n$ game graphically.
Unit-II Number of lectures: 12 Weightage: 50% Introduction to replacement problem, Type of failure, Replacement of items whose efficiency deteriorates with time, Replacement of items that completely fail.

REFERENCES:

1. Operations Research Theory & Application J.K.Sharma 4 th Edition Macmillan Pub. India Ltd.
2. Operations Research Kanti Swarup , Gupta P.K. , Manmohan Sultan Chand & Sons, New Delhi
3. Operations Research : PHI Shah, Gor, Soni

TEACHING INSTRUCTIONS:

1. Interactions with the students to gauge the subject-understanding of students
2. Explaining & Discussing the major terminologies and formulae related to the course

3. Use of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Semester III

Part/Class	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
Sem-III B.Sc. Mathematics		Semester III					
	CMAT-301	Calculus and Linear Algebra	3	30	70	100	3
	CMAT-302	Numerical Analysis	3	30	70	100	3
	PC CMAT-I	Mathematics Practical-I	6		100	100	3
	CPH-301	Basic Physics - I	3	30	70	100	3
	CPH-302	Basic Physics - II	3	30	70	100	3
	PPH-301	Physics Practical - III	6		100	100	3
	FCG-301	Basic English-III	2	15	35	50	2
	EMAT-301	Business Mathematics- I	2		50	50	2
	EGC-301	Principles of Management - I	2		50	50	2
				30	135	615	750

Semester – III

CMAT 301- Calculus and Linear Algebra

Rationale:

This course is designed to enable students to acquire the understanding and practice the applications of Calculus and Vector spaces.

Learning Outcome:

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

- Understand the concept of limit and continuity and apply it to various types of problems
- Understand the derivative of a variable and of implicit functions.
- Know about vector space, dimension and basis.
- Understand the concept of linear transformations

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory		Total Marks	
			Hrs.	Max Marks		
				Mid Term		End Term
CMAT- 301	Calculus & Linear Algebra	3	48	30	70	100

COURSE CONTENT

Number of lectures: 10

Weightage: 25%

Unit-1 : Limit, Continuity and Partial Derivatives

Function of several variables, their limits and continuity, partial derivatives, Differentiability and differential, Derivatives of implicit functions and applications

Number of lectures: 18

Weightage: 25%

Unit-2 : Application of Partial Derivatives

Euler's Theorem on homogenous function, Extrema of a function of several variables, Application of Lagrange multipliers to find the absolute extreme for a function, Taylor and Maclaurin's expansion for function of two variables (With Proof). Tangent plane and normal to surfaces.

Number of lectures: 10

Weightage: 25%

Unit-III : Vector Space

Vector spaces, Subspaces, Span of a set, Linear dependence and Independence, Dimension and basis.

Number of lectures: 10

Weightage: 25%

Unit-IV : Linear Transformations

Definitions and examples, Range and kernel of a linear map, Rank and nullity, Inverse of a linear transformation, The space $L(U,V)$, Composition of linear maps, Operator equations.

REFERENCE BOOKS:

1. Differential Calculus, by Shantinayakan.
2. Vector Analysis, by Murry R. Spiegel.
3. An Introduction to linear algebra, by V. Krishnamurthy, JL Arora, East West Press Pvt Ltd, New Delhi.
4. Advanced Calculus, by DV Widder, Prentice Hall, New Dellhi
5. Advanced Calculus, by R C Buck, MacMillan
6. Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mc Graw Hill
7. Linear Algebra, S K Berberion, Oxford University Press
8. Linear Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut
9. Linear Algebra, Gupta KP, Pragati Prakshan, Meerut

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	10
Unit 2	25	18
Unit 3	25	10
Unit 4	25	10
Total	100	48

Semester – III

CMAT 302- Numerical Analysis

Rationale:

This course is designed to enable students to acquire the understanding of numerical analysis.

Learning Outcome:

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

- Understand the concept of interpolation and extrapolation
- Understand the concept of numerical differential and apply to various problems
- Understand the concept of numerical differentiation and its applications

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 302	Numerical Analysis	3	48	30	70	100

COURSE CONTENT

Number of lectures: 15 **Weightage: 25%**

Unit-1 : Finite Differences table and theory of Interpolation:

Introduction to Numerical Methods, Approximations and Errors in Computation.
Interpolation, Extrapolation, Ascending and Descending differences, Symbolic operators, Difference polynomials, Gregory- Newton's Forward and backward interpolation formula.

Number of lectures: 12

Weightage: 25%

Unit-2 : Divided Differences:

Newton's divided difference interpolation formula, Lagrange's interpolation formula for equal and unequal intervals.

Number of lectures: 11

Weightage: 25%

Unit-III : Central Differences interpolation formula:

Gauss forward and backward interpolation formula, Sterling interpolation formula, Bessel's interpolation formula.

Number of lectures: 10

Weightage: 25%

Unit-IV : Numerical Differentiation and Integration:

Numerical differentiation using Newton's forward and backward method, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8th rule

REFERENCES:

1. Numerical Methods in Engineering and Science, Dr B.S Grewal, Khanna Publication.
2. Numerical Analysis and Computational Procedures, S.A Mollah, New Central Book Agency, Calcutta.
3. Numerical Analysis, Kunz, McGraw Hill
4. Methods in Numerical Analysis, K.W Nelson , Mac Millan.
5. Numerical Methods, Dr. N.Ch., S.N. Iyenger, Dr V.N. Vedomurthy, Vikas Publishing House Pvt. Ltd

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	15
Unit 2	25	12
Unit 3	25	11
Unit 4	25	10
Total	100	48

B.Sc Semester –III

Instructional Hrs: 6 hrs/week

Credit: 3

PC CMAT- I : Practicals on Mathematics – I

Practicals based on Calculus & Linear Algebra:

- 1 . Application of Limit and Continuity (Two Practicals)
2. Application of Partial Derivatives (Two Practicals)
3. Application of Lagrange's method
4. Application of Euler's theorem
5. Application of Taylor's and Maclaurin's theorems.
6. Applications of Vector Space, subspaces
7. To Expand linearly independent set upto a basis of a vector space
8. Verification on Dimension theorem and linear transformation
9. Verifications on Rank-Nullity theorem
10. To find the inverse of a Linear transformations and linear maps

Practicals based on Numerical Analysis :

1. Application of Gregory-Newton forward formula.
2. Application of Gregory-Newton backward formula.
3. Applications of Newton's divided difference formula.
4. Application of Lagrange's interpolation formula for equal and unequal intervals.
5. Application of Gauss forward and backward interpolation formula.
6. Application of Sterling interpolation formula.
7. Application of Numerical differentiation using Newton forward formula.
8. Application of Numerical differentiation using Newton backward formula
9. Application of Trapezoidal rule.
10. Application of Simpson's $1/3^{\text{rd}}$ rule & $3/8^{\text{th}}$ rule.

(Practicals based on numerical analysis can also be conducted in Sci lab/ Python / C language)

CPH 301- Basic Physics-I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 301	Basic Physics-I	3	48	30	70	100

COURSE CONTENT

Unit – I	Number of lectures: 12	Weightage: 25%
<ul style="list-style-type: none">• Heat and Thermodynamics: Characteristic functions, Enthalpy, The Helmholtz and Gibb's function, Two Mathematical Theorems, Maxwell's equations, The T-ds equations, Energy equation, The Thermal Expansivity, Compressibility, Joule-Kelvin effect (Porous plug Experiment), Liquefaction of Gases by Joule-Kelvin effect.• Kinetic Theory of Gases: Maxwell's Distribution Law of Velocities, Deduction of Maxwell – Boltzmann law, Determination of the values of constants 'a' and 'b', Experimental Test of Maxwell's Law.		

Unit - II	Number of lectures: 12	Weightage: 25%
<ul style="list-style-type: none">• Diffraction: Distinction between Interference and diffraction, Fresnel and Fraunhofer types of diffraction, Fraunhofer diffraction at a double slit, Fraunhofer diffraction at double slit (Calculus method), Distinct between single slit and double slit diffraction pattern, Fraunhofer diffraction at N slit, Plane diffraction grating, Theory of plane transmission grating, Dispersive power of Grating.		

UNIT - III**Number of lectures: 12****Weightage: 25%**

- **Crystal Structure:**
Crystalline and Amorphous Solids, Crystal Lattice and Crystal Structure, Translational Symmetry, Space, Unit Cell and Primitive Cell, Symmetry Elements in Crystals, The Seven crystal Systems, Coordination Number, Some importance crystal structure, Simple Cubic Structure, Body Centered Cubic Structure, Face Centered Cubic Structure, Wigner-Seitz Cells, Miller Indices, The spacing of a set of crystal planes.
- **Atomic Spectra:**
Franck-Hertz experiment, Critical potentials, Shortcomings of Bohr's Theory, Sommerfeld extension of Bohr theory

UNIT - IV**Number of lectures: 12****Weightage: 25%**

- **Special theory of Relativity:**
Newtonian Relativity, Michelson-Morley experiment, Special theory of relativity, Lorentz Transformation, Consequences of Lorentz Transformation-(a) Relativity of Simultaneity (b) the Lorentz-Fitz Gerald length Contraction (c) Time Dilation, Addition of Velocities, Mass-energy relation, Space time.

REFERENCES:

1. Heat and Thermodynamics by Mark W. Zemansky (5th Edition)
2. Thermodynamics and Statistical Physics by Singhal- Agarwal-Prakash Pragti Prakashan, Meerut.
3. University Physics by Sears, Zemansky and Young. (6th Edition) Narosa Publication, New Delhi.
4. Heat Thermodynamics and Statistical Physics by Brijlal, Dr. Subrahmanyam, P.S.Hemne S.Chand.
5. Waves and Oscillations by N Subramanyam, Brijlal.
6. A text book of OPTICS by Dr. N. Subrahmanyam, Brijlal, Dr. M. N. Avadhanulu - S.Chand
7. Introduction to Classical Mechanics by Takwale & Puranik Tata McGraw-Hill Publication (7th reprint-1986)
8. A Text book of Light by D.N.Vasudeva - S. Chand & Co.
9. Fundamentals of Optics by Jonkin's and White
10. Optics by Ajoy Ghatak
11. Principles of Optics by B.K. Mathur
12. Concept of Modern Physics by Besier McGraw-Hill
13. Elements of Special Relativity by S. P. Singh & M.K.Bagde S. Chand & Co. New Delhi.

14. Properties of Matter by Brijlal, N. Subrahmanyam, S.Chand.
15. Solid State Physics by Ajay Kumar Saxena (Macmillan India Limited)
16. Introduction to Solid State Physics by C. Kittel (John Wiley)
17. Fundamental of Solid State Physics by Saxena, Gupta, Saxena (Pragati Prakashan)
18. Elements of Solid State Physics by J. P. Srivastava (PHI).
19. Atomic and Molecular Physics by Raj Kumar (Campus Books)

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	12
Unit 2	25	12
Unit 3	25	12
Unit 4	25	12
Total	100	48

CPH 302- Basic Physics-II

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 302	Basic Physics-II	3	48	30	70	100

COURSE CONTENT

Number of lectures: 14	Weightage: 35%
Unit – I	
<ul style="list-style-type: none">• Electrostatics in Dielectric: Gaseous Non-Polar Dielectrics, Gaseous Polar Dielectrics, Non-Polar Liquids, Solid Dielectrics-Electrets.• Magnetostatics: The Magnetic Potentials, Magnetic Vector Potential due to Small Current Loop, An alternative method for finding the Vector Potential A and the Field B due to Current Loop, Magnetization, Magnetic Field Vector, Magnetic Susceptibility and Permeability, Boundary Conditions, Uniformly Magnetized Sphere in External Magnetic Field, A Comparison of Static Electric and Magnetic Fields.	

Number of lectures: 14

Weightage: 35%

Unit - II

- **Transistors Biasing and Stabilization:**
Bias Stabilization (Operating point stabilization), Stability factor, Stabilization by Collector Base Resistance, Stabilization by potential divider and Emitter resistor
- **Basic Transistor Amplifier:**
Transistor as a four pole, h-parameters with h-parameters equivalent circuit (complete), Grounded Emitter Circuit - Mathematical analysis using h- parameters only, Comparative Study of three types of Amplifiers.
- **Solid state Devices:**
JFET, UJT

Number of lectures: 14

Weightage: 35%

Unit - III

- **Fourier series:**
Introduction, Periodic functions, Application of Fourier series, Average values of a function, Fourier Co-efficient, Diriclet's conditions, Complex form of Fourier series, Parseval Theorem.
- **Co-ordinate Transformation:**
Curvilinear Coordinates, Scale factors and basis vectors for orthogonal systems

Number of lectures: 14

Weightage: 35%

Unit - IV

- **Schrodinger Equations:**
A free particle in one dimension, Generalization to three dimensions, The operator correspondence and the Schrodinger equation for a particle subject to forces, Normalization and Probability Interpretation, Non-Normalizable Wave functions and Box Normalization.

REFERENCES:

1. Electromagnetics by B.B. Laud, New Age Int. Publisher (For Chapt. a & b)
2. Electricity and Magnetism by Maharajan and Rangwala, THM
3. Electricity and Magnetism Berkeley Physics course Vol.-II by EDWARD M PURCELL, McGraw Hill Pub.
4. Hand book of Electronics by Gupta & Kumar 30th Revised Edition, 2002 Pragati Prakashan

5. Electronics and Radio Engineering by M.L. Gupta (9th Edition-2002) D Raj & Sons. (For Ch-(C))
6. Electronic Devices and Circuits by A. Mottershead Prentice – Hall of India.
7. Integrated Electronics by Millman & Halkias
8. Basic Electronics and Linear Circuits by N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta
9. Mathematical method for physical sciences by M. L. Boss John Wiley Publication.
10. Quantum Mechanics by John L. Powell and Bernd Crasemann
11. A Textbook of Quantum Mechanics by P.M.Mathews and K.Venkatesan (TMH)
12. Atomic Physics by Rajan (S. Chand New Delhi)
13. Mathematical Physics by B.D.Gupta

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme % Weightage	Teaching Scheme No. of Lecture
Unit 1	35	14
Unit 2	35	14
Unit 3	15	10
Unit 4	15	10
Total	100	48

PPH 301-Physics Practical-III

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes

LEARNING OUTCOMES:

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyse the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PPH- 301	Physics Practical-III	3	7 (7 hrs & 1 Day)	100	100

LIST OF EXPERIMENTS

Laboratory Course-1: Non Circuitry Experiments

1. To find the viscosity of a fluid using coaxial viscometer.
2. To determine wave length of bright lines of mercury light using diffraction grating.
3. To measure the resolving power of Telescope.
4. To find the wavelength of light using an “A” Edser Diffraction Pattern.
5. Determination of ‘y’ using Kundt’s tube.
6. To find Absolute Value of Capacitor using Ballistic Galvanometer (B.G.).
7. Determination of cardinal points and ‘do’ using Searl’s Goniometer.

Laboratory Course-2: Circuitry Experiments

7. To find the ratio of e/k using Power Transistor
8. To compare the Capacity of two capacitors (C_1/C_2) by De Sauty method.
9. To estimate the value of low Resistance by Projection Method for Electric Potential.
11. To determine self-inductance with the help of Anderson Bridge.
12. To study Common Base Transistor Characteristics (PNP).
13. To find the characteristics of JFET & Determination of μ , r_d , g_m

14. Construction of AND, OR, NOT Gates using NAND & NOR Universal gates.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

FCG 301- Basic English – III

RATIONALE: This course is designed to enable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

LEARNING OUTCOMES:

- Understand the functions and usage of change of voice, modal auxiliaries and adjectives/adverbs.
- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms out of alternative choices, joining clauses, sentences as directed, replacing indicated sections with single word / opposite / synonyms etc.
- Acquire interest in English language and literature through textbook lessons.
- Acquire additional vocabulary as prescribed in the textbook through use of idioms and phrases in meaningful sentences.
- Acquire the knowledge of different kinds of letter writing.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
FCG – 301	Basic English – III	2	24	15	35	50

COURSE CONTENT

Unit 1:	Number of lectures: 8	Weightage: 33%
Lesson 3 to 7		
‘Glimpses of Life – An Anthology of Short Stories (Orient Black Swan)		
Lesson-3 The Gift of Magi by O.Henry		
Lesson-4 The Child by Premchand		
Lesson-5 The Last Salvation by R.P.Sisodia		
Lesson-6 I Prepare to go to Coimbatore		
Lesson-7 A Slip of the Tongue by F.E.B.Gray		
Unit 2	Number of lectures: 4	Weightage: 17%
Vocabulary (Text based) from Lesson 3 to 7		
Use of Idioms and Phrases in meaningful sentences		

Unit 3	Number of lectures: 8	Weightage: 33%
English Grammar		
<ul style="list-style-type: none"> • Change of Voice • Modal Auxiliaries • Adjectives / Adverbs 		

Unit 4	Number of lectures: 4	Weightage: 17%
Letter Writing		
- Personal - Complimentary - Request - Regret - Invitation		

REFERENCES

1. High School English Grammar – Wrenn & Martin
2. Contemporary English Grammar – David Green

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	33	8
Unit 2	17	4
Unit 3	33	8
Unit 4	17	4
Total	100	24

Subjective Elective

Business Mathematics- I

Paper: EMAT- 301

RATIONALE: This course is designed to enable students to acquire understanding about logic, permutations and combinations.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EMAT- 301	Business Mathematics- I	2	24	00	50	50

COURSE CONTENT

<p>Unit-I</p> <p>Number of lectures: 12 Weightage: 50%</p> <p>Unit:1 Logic: [only examples] Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contradiction, Negation of Compound statements, Propositions, Conditional and Bi-Conditional statements. Set Theory: [only examples] Definition and methods of sets, types of sets, Venn diagrams, Operations on sets, De-Morgan's law, Finite and infinite sets.</p>
<p>Unit-II</p> <p>Number of lectures: 12 Weightage: 50%</p> <p>Unit:2 Permutations and Combinations: [only examples] Fundamental rules of counting, Definition of Permutations and Permutation of n different things, Permutation of repeated things, Circular Permutation, Definition of Combination standard results and examples.</p>

REFERENCES:

- (1) Business Mathematics, D.C. Sancheti & V.K. Kapoor, S Chad & Sons Publication, New Delhi.
- (2) Business Mathematics, B.S. Shah Prakashsan, Ahmedabad.

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.

3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

GENERIC ELECTIVE
EGC-301 Principles of Management - I

RATIONALE: This course is designed to enable students to acquire basic understanding of the Principles of Management.

LEARNING OUTCOMES:

The objective is to ensure that students learn the fundamental concepts of management; the basic functions of management like planning, organizing, controlling and leading

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EGC-301	Principles of Management I	2	24	00	50	50

Course Content

<p>Unit 1: Number of lectures: 12 Weightage:50% INTRODUCTION TO MANAGEMENT:</p> <p>Managing and Managers: Organizations and Need for Management, Management Process, Types of Managers, Management Levels and Skills, Challenges of Management, The Evolution of Management Theory: Early Thinking about Management, Neo-Classical, Classical and Modern Management Theories</p>
<p>Unit 2 Number of lectures: 12 Weightage:50% MANAGEMENT IN THE TWENTY-FIRST CENTURY</p> <p>Organizational and Natural Environments: Importance, Managing Multiple Stakeholder Relationships, Elements of the Indirect-Action Environment, Natural Environments, Managing Natural and Organizational Environments, Social Responsibility and Ethics: Changing concept of Social Responsibility, Shift to Ethics, Tools of Ethics, Globalization and Management: Globalization and Competitiveness, Changing International Scene, Global Business Practices</p>

REFERENCES

Text Book:

1. Management, James A .F. Stoner, R. Edward Freeman, Daniel R. Gilbert. Jr, Pearson, Latest Edition.

Reference Books:

1	Principles of Management, Koontz, Latest Edition, Tata McGraw Hill
2	Essentials of Management, Massie, Joseph L, Latest Edition, Pearson Education
3	Management, Robbins & Coulter, Latest Edition Prentice Hall of India
4	Fundamentals of Management: Essential Concepts and Applications Robbins S.P. and Decenzo David A, Latest Edition Pearson Education
5	Principles of Managemen, Tripathy PC and Reddy PN, Latest Edition, Tata McGraw-Hil

Semester IV

Sem IV B.Sc. Mathematics	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
	CMAT-401	Advanced Calculus	3	30	70	100	3
	CMAT-402	Advanced Linear Algebra	3	30	70	100	3
	PC CMAT-II	Mathematics Practical- II	6		100	100	3
	CPH-401	Basic Physics-III	3	30	70	100	3
	CPH-402	Basic Physics-IV	3	30	70	100	3
	PPH-401	Physics Practical-IV	6		100	100	3
	FCG-401	Basic English - IV	2	15	35	50	2
	EMAT- 401	Business Mathematics- II	2		50	50	2
EGC-401	Principles of Management II	2		50	50	2	
		30	135	615	750	24	

Semester – IV
CMAT 401- Advanced Calculus

Rationale:

This course is designed to enable students to acquire the understanding and practice the applications of curvature and integrals applied to real life mathematical problems.

Learning Outcome:

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

- Understand the concept of curvature of curves and points of inflexion.
- Understand the several forms of beta and gamma functions.
- Know about multiple integrals.
- Understand the concept of linear transformations

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 401	Advanced Calculus	3	48	30	70	100

Contents:

UNIT-1 CURVATURE & RADIUS OF CURVATURE

Number of lectures: 12 Weightage: 25%
Curvature of Plane curve, Radius of curvature of plane curve, Singular point for plane curve, Point of inflexion for plane curve.

UNIT-2 IMPROPER INTEGRAL

Number of lectures: 12 Weightage: 25%
Beta function and Gamma function, Convergence of Beta function and Gamma function, Relation between them, Its Simple properties and applications, Several forms of Beta function

UNIT-3 MULTIPLE INTEGRAL

Number of lectures: 12 Weightage: 25%
Double Integral, Integral on non rectangle regions, transformation to polar coordinate Change of the order of integration, Triple integration, transformation to polar and cylindrical

co-ordinate

UNIT-4 VECTOR ANALYSIS, LINE & SURFACE INTEGRAL

Number of lectures: 12

Weightage: 25%

Gradient of scalar function, Divergence and Curl of a vector function, Line integral, Surface Integral, Green's theorem, Stoke's and Gauss's Theorem

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

Reference Books:

1. Integral Calculus, Shantinarayan S. Chand, New Delhi (Course Book)
2. Advanced Calculus, D V Widder , Prentice Hall , New Delhi
3. Advanced Calculus Vol : I & II, T M Apostol, Blaisdoll
4. Advanced Calculus, R C Buck, MacMillan

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25%	12
Unit 2	25%	12
Unit 3	25%	12
Unit 4	25%	12
Total	100	48

Semester IV
CMAT 402 – Advanced Linear Algebra

Rationale:

This course is designed to enable students to acquire the understanding of advanced linear algebra.

Learning Outcome:

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

- Understand the concept of linear transformation applied to various problems.
- Understand the several forms of linear functional and duality.
- Know about inner product space.
- Understand the concept of eigen values and eigen vectors.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 402	Advanced Linear Algebra	3	48	30	70	100

Unit I : Matrices of a Linear Transformation

Number of Lectures: 12

Weightage: 25%

Definition of a Matrix of a linear transformation, Linear Transformation associated with a matrix, the dimension of $L(U,V)$, and its determination, Rank and Nullity of a Matrix, invertibility of system of linear equations.

UNIT II : Linear Functional And Duality

Number of Lectures: 12

Weightage: 25%

Definition of linear functional and its examples, Definition of Dual space and Dual basis and its examples, Adjoint of a linear operator, its properties and examples

UNIT III: Inner Product Space

Number of Lectures: 12

Weightage: 25%

Definition of inner product space, Norm, Orthogonality, Schwarz's & Triangular inequality, Parallelogram law, Orthonormal basis

UNIT IV: Eigen Values And Eigen Vectors

Number of Lectures: 12

Weightage: 25%

Eigen values and eigen vectors of a linear transformation, Characteristic polynomial, Cayley – Hamilton theorem, Finding inverse of a matrix using C–H theorem, minimal polynomial deductions.

Reference Books:

1. An Introduction to Linear Algebra' by V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi
2. Linear Algebra , Ramchandra Rao, P. Bhimasankar, Tata MacGrawHill
3. Topics in Algebra, I N Herstein, Wiley Eastern Ltd
4. Linear Algebra, S K Berberion, Oxford University Press
5. Linear Algebra Problem Book, P R Holmos, Cambridge University Press
6. Linear Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut
7. Linear Algebra, Gupta K P, Pragati Prakashan, Meerut
8. Linear Algebra, G Paria, New Central book agency Ltd, Calcutta
9. Surekh Bij Ganit, I H Sheth, University Granth Nirman Board (Gujarati)

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25%	12
Unit 2	25%	12
Unit 3	25%	12
Unit 4	25%	12
Total	100	48

B.Sc (Semester IV)

Instructional Hrs: 6Hrs/ week

Credits:3

PC – CMAT II : Practicals on Mathematics– II

(A) Practicals on Advanced Calculus and Linear Algebra:

1. Application of double Integration (graphically) (Two Practicals)
2. Application of Beta and Gamma functions (Two Practicals)
3. Application of Green's Theorem
4. Application of Stokes' theorem
5. Application of divergence theorems.
6. Applications of a linear transformation associated with given matrix.
7. Applications of a matrix associated with linear transformation
8. Verifications on Rank-Nullity theorem in matrices
9. Application of solution of system of linear systems
10. Application of a Dual Space
11. Application of Cayley- Hamilton theorem
12. Application of Eigen value and Eigen vectors of a linear transformation
13. Application of minimal polynomial deduction
14. Application to verify inner product space.

(B) Practicals on Advanced Numerical Analysis

Application of solution of an equation by:

1. Graphical method.
2. Method of False Position.
3. Method of Bisection.
4. Method of Iteration.
5. Newton Raphson method.
6. Application of Synthetic division method.
7. Application of Laplace Everett's interpolation formula.
8. Application of Bessel's interpolation formula.
9. Application on divided difference formula.
10. Application on Numerical differentiation.
11. Application on Numerical Integration.
12. Application on Euler's method.
13. Application on solving a system of equations using Gauss- Elimination method.
14. Application on solving a system of equations using Gauss-Jordan method.

(Practicals based on advanced numerical analysis can be conducted in Sci lab/ Python/ C language)

Semester- IV

CPH 401- General Physics-I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 401	General Physics-I	4	48	30	70	100

COURSE CONTENT

Unit – I <ul style="list-style-type: none">• Atomic Cohesion and Crystal Binding: Cohesion of Atoms, Primary Bonds, The Covalent Bond, The Metallic Bond, The Ionic Bond, Mixed Bond, Secondary Bonds, The Vander wall's Bond, The Hydrogen Bond, The Cohesive Energy, Ionic Crystal, Noble Gas Crystal, Atomic Radi. Vs Lattice constants, Elastic constants of crystals, Elastic Stress, Elastic strain, Dilation, Elastic Compliance and Stiffness constant, Elastic Energy density, Application to Cubic crystal, Bulk Modulus and compressibility	Number of lectures: 12 Weightage: 25%
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Unit - II**Number of lectures: 12****Weightage: 25%**

- **Physical Interpretation and Condition on ‘ Ψ ’:**

Conservation of Probability, Expectation values, Ehrenfest's Theorem
Admissibility Condition on the Wave function

- **Stationary States and Energy Spectra**

Stationary states: The time Independent Schrödinger Equation, A particle in a square well potential, Bound States in a square well ($E > 0$) (2.11),
The square well: Non localized states ($E > 0$).

UNIT - III**Number of lectures: 12****Weightage: 25%**

- **The Basic concepts of Plasma:**

Introduction , Composition and Characteristics of a Plasma, Collisions, Elastic collisions, Inelastic collisions, Surface Phenomena, Transport Phenomena, Diffusion and Mobility, Viscosity, Conductivity, Recombination, Ohm's law, Gas Discharge, Composition of various natural and Man-made Plasma, Plasma diagnostics, Plasma waves and Instabilities Confinement of Plasma, Space Plasma.

- **Polarization:**

Introduction, Polarization by double refraction, Double refraction, Huygens' explanation of double refraction, Types of polarized light, Retarders or Wave plates, Quarter wave plate, Half wave plate, Production of Elliptically polarized light, Detection of Elliptically polarized light.

UNIT - IV**Number of lectures: 12****Weightage: 25%**

- **Resolving Power:**

Resolving Power of Optical Instrument, Resolving Power of a telescope, Relation between magnifying power and resolving power of a telescope, Resolving Power of a Plane transmission grating.

REFERENCES:

1. A Text Book of Quantum Mechanics by Mathews and K.Venkatesan Tata Mc-Graw Hill Publication
2. A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M. N, Avadhanulu - S.Chand.
3. Quantum Mechanics by John L. Powell and Bernd Crasemann
4. Quantum Mechanics by Ghatak and Loknath
5. Quantum Mechanics by Schiff
6. A Text book of Light by D.N.Vasudeva - S. Chand & Co.
7. Fundamentals of Optics by Jonkin's and White
8. Optics by Ajay Ghatak
9. Principles of Optics by B.K. Mathur
10. Elements of Plasma Physics by S.N.Goswami New Central book Agency (P) Ltd., Calcutta.
11. A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr. M. N. Avadhanulu - S.Chand
12. Introduction to Plasma Physics and Controlled Fusion Vol.-1 by F. F. Chen
13. Plasma Physics by S. N. Sen

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	12
Unit 2	25	12
Unit 3	25	12
Unit 4	25	12
Total	100	48

CPH 402- BasicPhysics-IV

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 402	Basic Physics-IV	3	48	30	70	100

COURSE CONTENT

Unit – I	Number of lectures: 14	Weightage: 35%
<ul style="list-style-type: none">• Digital Electronics: Introduction, Number systems used in Digital Electronics, Decimal, Binary, Hexadecimal and Octal, Binary Codes-(A) BCD, (B) Gray, (C) Excess-3 Codes, Arithmetic Circuits – Exclusive - OR Gate, Applications of X-OR Gate: (i) Binary to Gray Code Converter (ii) A Parity Checker (iii) The Half Adder (iv) The Full Adder (v) Parallel Adder (vi) Half subtractor, (vii) Full subtractor.• A.C. Bridges: A.C. Bridges, Maxwell’s Bridge, Schering Bridge		
Unit - II	Number of lectures: 14	Weightage: 35%
<ul style="list-style-type: none">• Detectors: Introduction, Detectors for Nuclear Particles, (i) Proportional Counter (ii) Semiconductor detectors		

- **Radioactivity:**
(Review of Radioactive decay laws, half-life, mean life time etc.)
Radioactive growth and decay, Ideal equilibrium, Transient equilibrium and secular equilibrium, Radioactive series
- **The Q- Equation:**
Introduction, Types of Nuclear Reactions, The Balance of Mass and Energy in Nuclear Reactions, The Q-Equation, Solution of the Q-Equation.

UNIT - III

Number of lectures: 12

Weightage: 25%

- **Modern Physics:**
Orbital and Magnetic Dipole Moment, Larmor Precession, Space quantization, Electron spin, Vector model of atom, Spectroscopic terms and their notations, Stern Gerlach Experiment, Pauli's Exclusion Principle. Zeeman Effect- Normal Zeeman Effect and anomalous Zeeman Effect, Explanation of Normal Zeeman Effect, Explanation of Anomalous Zeeman Effect, Paschen back effect.

UNIT - IV

Number of lectures: 12

Weightage: 25%

- **Programming in – C:**
Overview of C: History of C, Importance of C, Sample Program: Printing a Message, Basic Structure of C Programs, Programming Style, Executing a C Program.

REFERENCES:

1. Hand book of Electronics by Gupta & Kumar 30th Revised Edition, 2002
Pragati Prakashan, Meerut.

2. Electricity and Magnetism By K.K.Tewari (S.Chand & Company Ltd.)

3. Programming in ANSI C by E.Balaguruswami (THM) (3rd Edition)
4. Nuclear Physics by S. B. Patel (New age International (p) Ltd. Publishers)
5. Elements of Nuclear Physics by M.L.Pandya & R.P.S.Yadav Kedarnath Ramnath Meerut
6. Nuclear Physics by Kaplan
7. Atomic & Molecular spectra by Rajkumar Kedarnath Prakashan Meerut
8. Spectroscopy Vol.-I by Walker & Straw
9. Atomic Physics by J.B.Rajam (5th Edition-1960) S. Chand & Co.
10. Physics of Atoms and Molecules by B. H. Bransden & C.J. Joachain, Pearson Education

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	25	12
Unit 2	25	12
Unit 3	25	12
Unit 4	25	12
Total	100	48

PPH 401-Physics Practicals-IV

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes

LEARNING OUTCOMES:

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyse the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PCH- 401	Physics Practical-IV	3	7 (7 hrs &1 Day)	100	100

LIST OF EXPERIMENTS

Laboratory Course-1: Non Circuitry Experiments

1. To determine the value of 'l', 'r' & 'a' using Resonance pendulum.
2. To study the X-ray diffraction (Powder) Pattern.
3. To find the decay of Temperature when body is allowed to cool. (Thermocouple)
4. To study elliptically polarized light using photocell and quarter wave plate.
5. To determine l using Hartzmann formula
6. To measure the activation energy of a semiconductor
7. To study the absorption co-efficient of liquid using photocell.

Laboratory Course-2:Circuitry Experiments

1. To determine current sensitivity, volt sensitivity, figure of merit and R_g of B.G.
2. To measure the high resistance by equal deflection method.
3. To measure the low resistance by Carry foster bridge.
4. To determine low value of 'C' using Schering bridge.s
5. To study the characteristics of UJT & Determination of R_{BB} , V_D & η

6. To study the characteristics of a Photodiode.
7. To verify De Morgan's Theorems using IC-7400.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

FCG 401- Basic English – IV

RATIONALE: This course is designed to enable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

LEARNING OUTCOMES:

- Acquire interest in English language and literature through textbook lessons.
- Acquire additional vocabulary as prescribed in the textbook through use of idioms and phrases in meaningful sentences.
- Understand the functions and usage of identification of clauses, non-finite verbs and prefix and suffix.
- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms out of alternative choices, joining clauses, sentences as directed, replacing indicated sections with single word / opposite / synonyms etc.
- Develop the skill of preparing application for jobs.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
FCG - 401	Basic English –4	2	24	15	35	50

COURSE CONTENT

Unit 1: Lesson 8 to 12 Number of lectures: 8	Weightage: 33%
‘Glimpses of Life – An Anthology of Short Stories (Orient Black Swan)	
Unit 2	Number of lectures: 4
Vocabulary (Text based) Use of Idioms and Phrases in meaningful sentences	
Unit 3	Number of lectures: 8
English Grammar <ul style="list-style-type: none"> • Identification of Clauses • Non-finite Verbs • Prefix and suffix 	
Unit 4	Number of lectures: 4

Weightage: 17%

Application for Jobs

Application writing for the various job

REFERENCES:

- | |
|---|
| 1. High School English Grammar – Wrenn & Martin |
| 2. Contemporary English Grammar – David Green |

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit 1	33	8
Unit 2	17	4
Unit 3	33	8
Unit 4	17	4
Total	100	24

Subjective Elective

Business Mathematics- II

Paper: EMAT- 401

RATIONALE: This course is designed to enable students to acquire understanding about development and measurement of some basic instruments

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EMAT- 401	Business Mathematics- II	2	24	00	50	50

COURSE CONTENT

Unit-I

Number of lectures: 12

Weightage: 50%

Classical- Statistical (or Empirical)- Axiomatic (Modern) definition of probability, Definitions of event, equally likely, mutually exclusive and exhaustive events, Probability theorems, Statement's of Baye's theorem and its examples, Conditional probability and its examples.

Unit-II

Number of lectures: 12

Weightage: 50%

Probability Distribution

Definitions of a Random variable, Probability Distribution of a random variable, Binomial distribution, Poisson distribution, Normal distribution, Exponential distribution and its examples.

REFERENCES:

- (1) Business Statistics, Bharat Jhunjhunwala, S. Chand Prakashan.
- (2) Business Statistics, R.S. Bhardwaj
- (3) Statistics (Chapter – 18 & 19) by, R.S.N. Pillai & V. Bagavathi, S. Chand & Company, New-Delhi

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.

3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

GENERIC ELECTIVE

EGC- 401 Principles of Management-II

RATIONALE: This course is designed to enable students to acquire basic understanding of the Principles of Management.

LEARNING OUTCOMES:

The objective is to ensure that students learn the fundamental concepts of management; the basic functions of management like planning,organizing, controlling and leading

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EGC-401	Principles of Management-II	2	24	00	50	50

Course Content

Unit 1: Number of lectures: 12 Weightage: 50%

PLANNING.

- Decision Making: Nature of Managerial Decision Making, Problem and Opportunity Finding, Deciding to Decide, Rational Model in Perspective
- Planning and Strategic Management: Planning an Overview, Strategic and Operational Plans, Concept of Strategy, Levels of Strategy
- Strategy Implementation: Matching Structure and Strategy, Institutionalizing Strategy, Operationalizing Strategy, Using Procedures to facilitate Implementation

Unit 2 Number of lectures: 12 Weightage: 50%

ORGANIZING.

- Organizational Design and Organizational Structure: Building Blocks, Organizational Design, Downsizing, Types of Organizational Structures.
- Power and the Distribution of Authority: Power, Authority, Line and Staff Authority, Centralization and Decentralization
- Human Resource Management: HRM Process, HRM and Strategy
- Managing Organizational Change and Innovation: Planned Change, Model of Change Process, Organizational Development

REFERENCES

Text Book:

Management, James A .F. Stoner, R. Edward Freeman, Daniel R. Gilbert. Jr, Pearson, Latest Edition.

Reference Books

Sr. No	Author/s and Edition	Publication	Title
1	Koontz, Latest Edition	Tata McGraw Hill	Principles of Management
2	Massie, Joseph L, Latest Edition	Pearson Education	Essentials of Management
3	Robbins & Coulter, Latest Edition	Prentice Hall of India	Management
4	Robbins S.P. and Decenzo David A, Latest Edition	Pearson Education	Fundamentals of Management: Essential Concepts and Applications
5	Tripathy PC And Reddy PN, Latest Edition	Tata McGraw-Hill	Principles of Management

EXAMINATION PATTERN

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR

B.Sc. Chemistry, Semester III/IV, End Term Examination,

Month-Year

Subject: Code-Title

Time: 3 hrs

Date

Maximum marks: 70

Que. No : 1	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 2	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 3	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 4	Write any Ten out of Twelve (Four questions to be asked from each unit) Short question/MCQ/Short numerical/Diagram	10 Marks
Total marks		70 marks

PRACTICAL EXAMINATION PATTERN FOR CHEMISTRY:

- One day per batch(27 to 30 student per batch)
- Certified Journals are compulsory for the exam

Laboratory Course –I Organic Chemistry / Analytical Chemistry Viva voce	3.5 hrs	35 marks 10 marks
Laboratory Course -II Physical Chemistry / Inorganic Chemistry Viva voce	3.5 hrs	40 marks 10 marks
Journal		5 marks
Total marks		100 marks

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR

B.Sc. Physics , Semester III/IV, End Term Examination,

Month-Year

Subject: Code-Title

Time: 3 hrs

Date

Maximum marks: 70

Que. No : 1	(A) : Attempt any one out of two (B) : Write a short note on any one out of two (C) : Attempt any one out of two (Definition/ Short Question)	07 Marks 05 Marks 02 Marks
Que. No : 2	(A) : Attempt any one out of two (B) : Write a short note on any one out of two (C) : Attempt any one out of two (Definition/ Short Question)	07 Marks 05 Marks 02 Marks
Que. No : 3	(A) : Attempt any one out of two (B) : Write a short note on any one out of two (C) : Attempt any one out of two (Definition/ Short Question)	07 Marks 05 Marks 02 Marks
Que. No : 4	(A) : Attempt any one out of two (B) : Write a short note on any one out of two (C) : Attempt any one out of two (Definition/ Short Question)	07 Marks 05 Marks 02 Marks
Que. No : 5	Attempt any 14 out of 15 each question carry 1 marks (At least three questions should be from each unit) <ul style="list-style-type: none">• Multiple Choice• Fill in the blank• Definition• Short question• Match the following.• Assertion / Reason of True / False.	14 Marks
Total marks		70 marks

PRACTICAL EXAMINATION PATTERN FOR PHYSICS

- One day per batch (27 to 30 student per batch)
- Certified Journals are compulsory for the exam

Laboratory Course -I Non Circuitry Experiments	3.5 hr)	35 Marks
Viva Voce		10 Marks
Laboratory Course -II Circuitry Experiments	3.5 hrs	40 Marks
Viva Voce		10 Marks
Journal		5 Marks
Total Marks		100 Marks

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR
B.Sc. Semester III/IV, END TERM Examination,
Month-Year
Subject: Basic English

Time: 2 hrs

Date

Maximum marks: 35

Que. No : 1	General Question from Text Write any One out of Two Questions	06 Marks
Que. No : 2	Answer in one or two sentences (three out of five)	06 Marks
Que. No : 3	Match the following words with their meanings	05 Marks
Que. No : 4	(a)Fill in the blanks with proper forms of modal auxiliaries given in the brackets (4 marks)	12 Marks
Que.No: 5	Letter writing (any one out of three)	6 marks
Total		35 marks

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR
B.Sc. Semester III/IV, END TERM Examination,
Month-Year
Subject: Subjective Elective/Generic Elective

Time: 2 hrs

Date

Maximum marks: 50

Que. No : 1	Attempt any three out of Four (Descriptive)	21 Marks
Que. No : 2	Attempt any Four out of six (Short Notes)	20 Marks
Que. No : 3	Attempt any Three out of Four (Very Short Answers)	09 Marks
Total marks		50 marks

Semester V

Sem V B.Sc. Mathematics	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
	CMAT-501	Group Theory	3	30	70	100	3
	CMAT-502	Mathematical Analysis- I	3	30	70	100	3
	CMAT-503	Differential Equations	3	30	70	100	3
	CMAT-504	Operations Research- I	3	30	70	100	3
	PC CMAT-III	Mathematics Practical- III	12		200	200	6
	EMAT- 501	Business Mathematics- III	2		50	50	2
	EGC- 501	Environmental Science & Disaster Management	2		50	50	2
	FCG-501	Compulsory English (L.L.)	2	15	35	50	2
			30	135	615	750	24

Semester- V

CMAT 501- Group Theory

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic concepts of algebraic structures.

LEARNING OUTCOMES:

- Understand the concept of various algebraic structures.
- Develop an understanding of cycle groups and quotient groups
- Understand the concept of homomorphism and isomorphism of groups

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 501	Group Theory	3	48	30	70	100

COURSE CONTENT

Number of Lectures: 15

Weightage: 34%

Unit I : Definition of a Group and illustrations, Elementary property of a Group, Equivalent definitions of a Group, Generalized form of Associative Law, Finite Groups and their tables, Definition of a Subgroup and illustrations, Lagranges theorem and its applications.

UNIT II :

Number of Lectures: 15

Weightage: 33%

Definition of a Permutation and illustrations, Transpositions and cycle, definition of a Normal subgroup and illustrations, Quotient group, Definition of an isomorphism of a group and its illustrations.

UNIT III:

Number of Lectures: 18

Weightage: 33%

Properties of a cycle groups, Isomorphism of cyclic groups, Subgroup of a cycle group, Generator of a cycle group, Definition of a Homomorphism and its illustrations, Kernel of Homomorphism, Cayley's Theorem, Isomorphism of group, Groups of order four and six.

REFERENCES:

1. Abstract Algebra, I H Sheth, Prentice Hall of India (PHI) Publication.
2. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
3. Basic Algebra Vol I & II, N. Jacobson, Hindustan Publishing company
4. A text book of Modern Algebra, Shanti Narayan, S. Chand & Co.
5. Basics Abstract Algebra, (second Edition), P.B.Bhattacharya, S.K.Jain, S R Nagpal, Cambridge University Press.
6. University Algebra, N.S. Gopalkrishna, Wiley Eastern, New Delhi
7. Algebra, MacLane Saunders and Birkhoff Garrett, MacMillan, New York.
8. Introduction to Topology and Modern Analysis, G.F.Simmons, MacGraw Hill Inc., U.S.A.

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	18
Total	100	48

Semester- V

CMAT 502- Mathematical Analysis-I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic concepts of number system and topological spaces.

LEARNING OUTCOMES:

- Understand the concept of number system.
- Develop an understanding of basic topology
- Gain knowledge about sequence and series

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 502	Mathematical Analysis-I	3	45	30	70	100

COURSE CONTENT

Unit-1 Number System:

Number of Lectures: 15

Weightage: 34%

The real field to be developed by ordered set approach, Equivalence of this approach and Dedekind's approach, Extended real number system, The complex number system, Euclidean spaces.

Unit-2 Basic Topology:

Number of Lectures: 15

Weightage: 33%

Finite, Countable and Uncountable sets, Metric space, Neighborhoods in metric spaces, Limit point of a set, Open, Closed, Bounded, Compact, Perfect, Connected and Convex subsets of metric spaces.

Unit-3 Sequences and Series:

Number of Lectures: 18

Weightage: 33%

Convergence sequence, Sub sequences, Cauchy sequences, Upper and lower limits, Special sequences and Series, Series of non negative terms, Roots and Ratio Test, Power Series with Real (Complex) terms, Interval (circle) of convergence and radius of convergence of a power series, Summation by parts, absolute convergence, addition and multiplication of series.

Reference books:

1. “Principles of Mathematical Analysis” by Walter Rudin, McGraw Hill (International Student Edition), 3rd Edition.
2. “A First Course in Mathematical Analysis” by D. Somasundaram & B. Choudhary, Narosa Publishing House
3. “Fundamentals of Mathematical Analysis” by G. Das & S. Pattnayak Tata Mcgraw Hill Pub. Co
4. “Fundamental of Real Analysis” by S. L. Gupta & Nisha Rani – Vikas Pub. House Pvt. Ltd. New Delhi-1974.
5. “Principle of Real Analysis “by S.C.Malik , Wiley Eastern Limited New Delhi 1982.
6. “Principle of Mathematical Analysis” by T.M. Apostol

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	18
Total	100	48

Semester- V

CMAT 503- Differential Equations

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic concepts of Differential equations.

LEARNING OUTCOMES:

- Understand the concept of.
- Develop an understanding of the

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 503	Differential equations	3	48	30	70	100

COURSE CONTENT

Unit: 1

Number of Lectures: 15

Weightage: 34%

Formation of Differential Equations, Symbolic Operator, Method of finding C.F., Symbolic Operator $1/f(D)$, Method of finding P.I., Shorter method of finding P.I., To find P.I. when $X=e^{ax}$, where a is constant, To finding P.I. when $X=\cos ax$ or $\sin ax$, To find the value of $1/f(D).x^m$, where m is positive integer, To find the value of $1/f(D).(e^{ax}V)$, where a is constant and V is a function of x . To evaluate $1/f(D).(XV)$, where V is a function of x .

Unit:2

Number of Lectures: 15

Weightage: 33%

Condition of Exactness of the linear differential equations, Solution of non-linear equations which are Exact, Equations of the form $y^{(n)}=f(x)$, Equations of the form $y^{(2)}=f(y)$, Equation do not contain y directly, Equation that do not contain x directly, Equation in which y appears in only two derivatives whose orders differ by two, Equation in which y appears in only two derivatives whose order differ by unit.

Unit:3

Number of Lectures: 18

Weightage: 33%

Method of solving $y^{(2)}+Py^{(1)}+Qy=R$ when an integral included in the C.F. is known,
Method of solving $y^{(2)}+Py^{(1)}+Qy=R$ by changing the dependent variable, $y^{(2)}+Py^{(1)}+Qy=R$
by changing the independent variable, Solution by factorization of the Operator, Method
of variation of Parameters, Method of Undetermined Co-efficient.

REFERENCE BOOKS:

1. A text book of Differential Equation, by N.M.Kapoor, Pitamber publication, New Delhi.
2. Advanced Engineering mathematics, Erwin Kreyszing, John Wiley & Sons Inc. New York, 1999.
3. Introductory course on Differential Equations, D.A.Murray By. Orient Longman,(India), 1967.
4. A Terastise on Differential Equations, A.R.Forsyth, Macmillan and Co.Ltd., London.
5. Elements of partial Differential Equations, Ian N. Sneddon, McGraw-Hill Book Compony, 1998.
6. Advanced Calculus for Application, Fracis B. Hilderbrand, Prentice Hall of India Pvt. Ltd., New Delhi, 1977.
7. Differential Equations, Jane Cronin, Marcel Dekkar, 1994.
8. Theory and Problems of Differential Equations, Frank Ayres, McGraw-Hill Book Compony, 1972.

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	18
Total	100	48

Semester- V

CMAT 504- Operations Research -I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic concepts of Operations Research.

LEARNING OUTCOMES:

- Understand the concept of.
- Develop an understanding of the.
- Gain knowledge about the

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 504	Operations Research- I	3	45	30	70	100

COURSE CONTENT

Unit-1.

Number of Lectures: 18

Weightage: 34%

Introduction: Nature and scope of Operations Research. **Linear programming:** (a) LP Model and method of solution- Graphical method, Slack-Surplus and unrestricted variables, Simplex Algorithm, Simplex Method.

Unit-2 .

Number of Lectures: 18

Weightage: 33%

Artificial Slack variables, Two phase method, Big-M / Penalty method, Variation in simplex method solution- unbounded, infeasible solutions and concept of degeneracy.

Unit-3.

Number of Lectures: 18

Weightage: 33%

(a) Duality Theory-

The essence of duality theory, primal-dual relationships, Duality theorems, Dual simplex method.

(b) Integer Programming- The need of integer solutions, The concept of the Cutting – Plane, Gomory’s Cutting Plane Algorithm, Branch and Bound Method (sums of B & B not to be asked in the exam.)

REFERENCES BOOKS:

1. Operations Research , by. J.K.Sharma. Macmillan Publishers India Ltd.
2. Operations Research by Nita Shah, Ravi Gor and Hardik Soni, Prentice Hall of India.
3. Operations Research(Principles and Practice) by Pradeep Prabhakar Pai, Oxford University Press.

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	18
Total	100	48

B.Sc Semester V

PC-CMAT III: Practicals on Mathematics -III

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PCMAT-501	Mathematics Practical -III	6	12	200	200

Objectives:

- Understand the MATLAB Desktop, Command window and the Graph Window
 - Be able to do simple and complex calculation using MATLAB
 - Understand the graphics capabilities of MATLAB
 - Be able to carry out mathematical computations using MATLAB Symbolic Toolbox
-

PCMAT-501 Introduction to MATLAB

Starting and ending MATLAB session, MATLAB environment, MATLAB help, types of files, search path, some useful MATLAB commands, data types, constant and variables, operators, built-in functions, assignment statement, illustrative programs.

Vectors and Matrices

Scalars and vectors, entering data in matrices, line continuation, matrix subscripts/indices, multi-dimensional matrices and arrays, matrix manipulations, generation of special matrices, useful commands, matrix and array operations, function with array inputs.

PCMAT-502 Polynomials

Entering a polynomial, polynomial evaluation, roots of a polynomial, polynomial operations - addition and subtraction, multiplication, division, formulation of polynomial equation, characteristic polynomial of a matrix, polynomial differentiation, integration, and curve fitting, evaluation of polynomial with matrix arguments.

PCMAT-503 MATLAB Graphics:

Two-dimensional plots, multiple plots, style options, legend command, subplots, specialized two-dimensional plots, three-dimensional plots.

PCMAT-504 Symbolic Processing With MATLAB

Symbolic Expressions and Algebra, Algebraic and Transcendental Equations, Calculus, Symbolic Linear Algebra, ordinary and partial differential equation, Symbolic Tutors.

Text Book:

1. “MATLAB and its Applications in Engineering” Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson.

Coverage from the Text Book:

PCMAT-501

Chapter 1: 1.8, Chapter 2: 2.9 Chapter 3: 3.11

PCMAT-502

Chapter 4: 4.13

PCMAT-503

Chapter 6: 6.8

PCMAT-504

Chapter 9: 9.3 only. Additional commands for symbolic toolbox are to be covered from the list given below.

Symbolic Math Toolbox

Functions for Creating and Evaluating Symbolic Expressions	
Class	Returns the class of an expression.
Digits	Sets the number of decimal digits used to do variable precision arithmetic.
Double	Converts an expression to numeric form.
Ezplot	Generates a plot of a symbolic expression.
ezplot3	3-D parametric plot
Ezpolar	plot a 2-D curve in polar coordinates
Findsym	Finds the symbolic variables in a symbolic expression.
Numden	Returns the numerator and denominator of an expression.
Sym	Creates a symbolic variable.
Syms	Creates one or more symbolic variables.
Vpa	Sets the number of digits used to evaluate expressions.

Functions for Manipulating Symbolic Expressions

Collect	Collects coefficients of like powers in an expression.
Expand	Expands an expression by carrying out powers.
Factor	Factors an expression.
poly2sym	Converts a polynomial coefficient vector to a symbolic polynomial.
Pretty	Displays an expression in a form that resembles typeset mathematics.
Simple	Searches for the shortest form of an expression.
simplify	Simplifies an expression using Maple's simplification rules.
Subs	Substitutes variables or expressions.
sym2poly	Converts an expression to a polynomial coefficient vector.

Symbolic Calculus Functions

Diff	Returns the derivative of an expression.
jacobian	Compute the Jacobian matrix.
Dirac	Dirac delta function (unit impulse).
Heaviside	Heaviside function (unit step).
Int	Returns the integral of an expression.
Limit	Returns the limit of an expression.
Symsum	Returns the symbolic summation of an expression.
Taylor	Returns the Taylor series of a function.

Symbolic Linear Algebra Functions

Det	Returns the determinant of a matrix.
Eig	Returns the eigenvalues (characteristic roots) of a matrix.
Inv	Returns the inverse of a matrix.
Poly	Returns the characteristic polynomial of a matrix.

Symbolic Tutors

Arclen	Find the arclength of the curve.
composefun	compose two functions
dirdifftool	plot or animate directional derivatives
Eigtool	interactive matrix eigenvalues
gradtool	plot or animate gradient(s)
linsys	plot a system of 2-D or 3-D linear equations
ratfun	demonstrate the graphing of rational functions
rsums	Riemann sum approximate integration tutor
taylortool	taylor approximation tutor

Assignment: The student should submit the electronic copy of diary file showing the execution/output of Matlab session(s).

FCG 501- Basic English– V

RATIONALE: This course is designed to enable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

LEARNING OUTCOMES:

- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms out of alternative choices, etc.
- Acquire interest in English language and literature through textbook lessons.
- Acquire translation skill through translate from English to Gujarati/Hindi exercises
- Acquire the knowledge of different kinds of dialogue writing.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
FCG - 501	Basic English – V	2	24	15	35	50

COURSE CONTENT

Unit I Number of lectures: 8 Lesson 1 : <i>An Astrologer's Day</i> by R.K.Narayan Lesson 5 : <i>Vanishing Animals</i> by Gerald Durrell Lesson 6 : <i>Education: India and America</i> by Anurag Mathur Poem 11 : <i>Where the mind is without Fear</i> by Rabindranath Tagore Poem 12 : <i>Stopping by Woods on a Snowy Evening</i> by Robert Frost Poem 13 : <i>Sonnet 29</i> by William Shakespeare 'The Joy of Reading' – Selected Prose & Poetry	Weightage: 33%
Unit II Indirect Narration Conjunction Use of Phrasal Preposition and Verbs: (1) In spite of (2) Instead of (3) Owing to (4) Due to (5) Because of (6) With a view to (7) On account (8) According to (9) In order to (10) Account for (11) Abide by (12) Look for (13) Wind up (14) Come across (15) Break into (16) Give in (17) Keep up (18) Look forward to (19) Put off (20) Set out (21) Run into (22) Look after (23) Bring up (24) Get off (25) Cut down (26) Fall through (27) Work out (28) Shut down (29) Hand over (30) Pull down	Number of lectures: 4 Weightage: 17%

Unit III Translation from English to Gujarati/Hindi	Number of lectures: 8 Weightage: 33%
Unit IV Dialogue Writing	Number of lectures: 4 Weightage: 17%

REFERENCES

1. High School English Grammar – Wrenn& Martin
2. Contemporary English Grammar – David Green

INSTRUCTION STRATEGIES

5. Interactions with the students to understand the level of students
6. Explaining & discussing English language structures.
7. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
8. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	33	8
Unit II	17	4
Unit III	33	8
Unit IV	17	4
Total	100	24

GENERIC ELECTIVE

EGC-501, Environment Science and Disaster Management

RATIONALE OF STUDY: To learn about the area of environment science with selection of elective paper. This paper is designed to enable students to acquire basic understanding of the environment, environmental disasters and its management. It also provides information about mitigation methodology for the environmental disasters. It also gives information about psychological health and mental therapies and social awareness.

LEARNING OUTCOMES:

The students will learn about the basic concepts of environmental disasters, pre disaster management and post disaster management, and social awareness.

TEACHING & EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of their regular attendance in classroom & external (50 marks) university

COURSE CONTENT

Course	Title	Credit	Theory (hrs/week)	External	Internal	Total
ECG-501	Environment Science and Disaster Management	2	2	50	-	50

Unit I <ul style="list-style-type: none">• Introduction to Environment• Global Environmental Issues: Climate Change, Ozone layer depletion, Global Warming• National Environmental issues: Water Pollution Management, Air Pollution, Vehicular pollution management, E-waste, Desertification Issues, Wild Life and Forest Management• EIA (Environment Impact Assessment)	Number of lectures: 12 Weightage: 50%
Unit II <ul style="list-style-type: none">• General concept of disaster management: Introduction, Primary concept, from management to mitigation of disaster• risk assessment and vulnerability analysis• public awareness and training,• Causes and effects of disaster• Pre disaster management: various steps/arrangement during pre-disaster management.• Management during disaster and post disaster: earth quake, drought, diseases, flood, cyclones, land slide	Number of lectures: 12 Weightage: 50%

REFERENCES:

1. Modi C D & others (2006) Paryavaran and AapattiVyavasthapan [Gujarati], Swami prakashan, Patan-384265
2. Patel J C (2006) Paryavaran and disaster management [Gujarati], Parshwa publication, Ahmedabad-380001
3. ErachsBharucha (2008, first edition) ParyavaranAdhyayan [Gujarati], Orient Longman Pvt. Ltd., Hyderabad.
4. Distributor: M/S Himanshu book company, 06-07 Shri JayendrapuriBhavan, Ellisbridge, New Sanyas Ashram, Ahmedabad – 380 006.
5. K RamanaMurthi, 2004 Disaster Management, Dominant Publishers and Di sributors, New Delhi -110002

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Subjective Elective

Paper: EMAT- 501

Business Mathematics- III

RATIONALE: This course is designed to enable students to acquire understanding about the basic concepts of calculus applied to real life mathematical problems.

LEARNING OUTCOMES:

- Understand the concept of differential calculus and integral calculus.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EMAT- 501	Business Mathematics- III	2	24	00	50	50

COURSE CONTENT

Unit: 1 [Differential Calculus] [only examples]

Number of Lectures: 12

Weightage: 50%

Definition of differentiation in one variable, Working rules of differentiation, Derivative of x^n , $\log x$, e^x , a^x , trigonometric functions and inverse trigo. Functions, Differentiation of method of substitution and implicit function, parametric equations, Diff. of $f(x)^{g(x)}$.

Unit: 2 [Integral Calculus] [only examples]

Number of Lectures: 12

Weightage: 50%

Indefinite integral: Definition, Working rules of integration, integration of x^n , a^x , e^x , integration of $\frac{1}{x^2 \pm a^2}$; $\frac{1}{\sqrt{x^2 \pm a^2}}$; $\frac{1}{\sqrt{a^2 - x^2}}$; $\frac{1}{|x|\sqrt{x^2 - a^2}}$ integration of trigonometric functions, integration by method of substitution,

Some standard results: $\int f(x)dx = F(x) + c \Rightarrow \int f(ax+b)dx = \frac{1}{a}F(ax+b) + c$,

$$\int [f(x)]^n \cdot f'(x)dx, \int \frac{f'(x)}{f(x)} dx, \int \frac{1}{ax^2 + bx + c} dx, \int \frac{1}{\sqrt{ax^2 + bx + c}} dx.$$

Reference books:

1. Business Mathematics, D.C.Sancheti & V.K.Kapoor, Sultan Chand & Sons Publication, New Delhi.
2. Business Mathematics, B.S.Shah Prakashan, Ahmedabad.
3. Any Advance Calculus books used in Science Stream.

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Third Year B.Sc. (Mathematics)

Semester VI

Sem VI B.Sc. (Mathematics)	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
	CMAT-601	Abstract Algebra	3	30	70	100	3
	CMAT-602	Mathematical Analysis- II	3	30	70	100	3
	CMAT-603	Graph Theory	3	30	70	100	3
	CMAT-604	Operations Research- II	3	30	70	100	3
	PC- CMAT IV	Mathematics Practical - IV	12		200	200	6
	EMAT- 601	Business Mathematics- IV	2		50	50	2
	EGC- 601	Advanced Communication Skills	2		50	50	2
	FCG-601	Basic English – VI	2	15	35	50	2
			30	135	615	750	24

Semester- VI

CMAT 601- Abstract Algebra

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic concepts of abstract algebra applied to rings and polynomials.

LEARNING OUTCOMES:

- Understand the concept of algebraic structures eg. rings.
- Develop an understanding of polynomials.
- Gain knowledge about the quotient rings and homomorphism.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 601	Abstract Algebra	3	48	30	70	100

COURSE CONTENT

Unit I

Number of Lectures: 15

Weightage: 34%

Definition of a Ring and illustrations, Properties of a Ring, Zero divisors and Integral domain, Characteristic of an Integral Ring, Solution of the equation $ax = b$ in a ring R , Subrings, Ideals

UNIT II

Number of Lectures: 15

Weightage: 33%

Introduction of Polynomials, Integral Domain $D[x]$, Familiar form of Integral domain $D[x]$, Unique factorization of Polynomials, Solutions of a Polynomial Equation, Eisenstein Criterion for irreducibility.

UNIT III

Number of Lectures: 18

Weightage: 33%

Quotient ring, Homomorphism of rings, Maximal Ideal, Prime Ideal

Reference books:

1. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
2. Basic Algebra Vol I & II, N. Jacobson, Hindustan Publishing company
3. A text book of Modern Algebra, Shanti Narayan, S.Chand & Co.
4. Basics Abstract Algebra, (second Edition), P.B.Bhattacharya, S.K.Jain, S R Nagpal, Cambridge University Press.
5. University Algebra, N.S. Gopalkrishna, Wiley Eastern, New Delhi
6. Algebra, Maclane Saunders and Birkhoff Garrett MacMillan, New York.
7. Introduction to Topology and Modern Analysis, G.F.Simmons, MacGrawHill Inc., U.S.A.

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	18
Total	100	48

Semester- VI

CMAT 602- Mathematical Analysis-II

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic concepts of differentiation and limits & Continuity.

LEARNING OUTCOMES:

- Understand the concept of .
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 602	Mathematical Analysis- II	3	48	30	70	100

COURSE CONTENT

Unit I

Number of Lectures: 15

Weightage: 34%

Limits and Continuity: Limits and Continuity for a functions from a metric space into another metric space, continuity of a composite function, Structural properties of continuous functions from a metric space in to \mathbb{R}^k , Continuity and Compactness, Continuity and connectedness, Discontinuities, Monotonic function, Discontinuities of a monotonic function, Infinite limits and limits at infinity.

Differentiation: Derivatives of a real function, Continuity and differentiability, Structural properties of the class of differentiable functions, Mean value theorems, Continuity of derivatives, L'Hospital rule, Derivatives of higher order, Taylor's theorem.

UNIT II

Number of Lectures: 15

Weightage: 33%

The Riemann – Stieltje's Integral: Riemann integral and Stieltje's integral, properties of Riemann integral and Stieltje's integral, Integration and Differentiation, Integration of Vector Valued Functions, Rectifiable curves.

UNIT III

Number of Lectures: 18

Weightage: 33%

Sequences and Series of functions: Sequences of functions, Limit of a Sequence of functions, Uniform convergence, tests for uniform convergence and continuity, Uniform convergence and differentiation.

Reference books:

1. Principles of Mathematical Analysis, Walter Rudin, McGraw Hill (International Student Edition), 3rd Edition.
2. A First Course in Mathematical Analysis, D. Somasundaram & B. Choudhary, Narosa Publishing House.
3. Fundamentals of Mathematical Analysis, G. Das & S. Pattnayak Tata Mcgraw Hill Pub.Co
4. Fundamental of Real Analysis, S. L. Gupta & Nisha Rani – Vikas Pub. House Pvt. Ltd. New Delhi-1974.
5. Principle of Real Analysis, S.C.Malik , Wiley Eastern Limited New Delhi, 1982.

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	18
Total	100	48

Semester- VI

CMAT 603- Graph Theory

RATIONALE: This course is designed to enable students to acquire basic understanding of the graph theory, its concepts and applications.

LEARNING OUTCOMES:

- Understand the concept of graph, path
- Develop an understanding of adjacency matrix of a graph
- Know about the applications of graph w.r.t colouring of graphs

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CMAT- 603	Graph Theory	3	48	30	70	100

COURSE CONTENT

Unit I

Number of Lectures: 15

Weightage: 34%

Graphs: Basic Definitions, Undirected Graphs, Mixed Weighted Graphs, Incidence and Degree, Bipartite Graph and Bipartition, Regular and K-regular Graph, Graph Isomorphism's, Sub Graphs, Graph Operations, Walk, Trail, Paths ,Circuits, Connected Graph, Disconnected Graph, Eccentricity, Radius and Diameter, Adjacency Strong ,Weak and Unilateral Components, Euler Graphs, Hamilton Paths, Trees, Binary Trees and m-array Tree, Spanning Trees.

UNIT II

Number of Lectures: 18

Weightage: 33%

Cut set, Internally Disjoint Paths, Connectivity and Separability, Planar Graphs and their different Representation, Detection of Planarity, Geometric and Combinatorial duals, Vector Space Associated with a Graph. Circuit and Cut set Subspaces ,Orthogonal Vectors And spaces.

UNIT III

Number of Lectures: 15

Weightage: 33%

Incidence Matrix, Adjacency Matrix of a Graph. Path matrix and their relationships. Colouring of a Graph, Chromatic Number, Chromatic Partitioning, Covering. Acyclic digraphs and diacyclizations.

REFERENCE BOOKS:

1. An Introduction To Discrete Mathematics - Udayan M.Prajapati Dr.Ajay S. Gor, Nirav Prakashan
2. Graph Theory with Applications to Engineering and Computer Science by Narsing Deo
3. Discrete Mathematical Structures With Applications to Computer Science
by Trembley I.P.AndMahonar R.
4. Graph Theory by Harary F.
5. Graph Theory and its applications by B. Harris
5. Discrete Mathematical Structures With applications to Computer Science
by R.Hamming and E.A.Feigenbaum
4. Discrete Mathematical Structures for Computer Science by B.Kolman and R.C.Busy
5. The Essence of Discrete Mathematics by Neville Dean

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	18
Unit III	33	15
Total	100	48

Semester- VI

CMAT 604- Operations Research- II

RATIONALE: This course is designed to enable students to acquire basic understanding of the Operations research and its various models

LEARNING OUTCOMES:

- Understand the concept of transportation models and assignment problem.
- Develop an understanding of sequencing problems
- Gain knowledge about game theory and dominance principle.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 604	Operations Research- II	3	48	30	70	100

COURSE CONTENT

Unit I

Number of Lectures: 15

Weightage: 34%

Transportation Problem- Introduction, general method of a T.P., unbounded T.P. NWCM, Least cost method, VAM methods to find the initial solution, Dual of a T.P. and MODI method, degeneracy in a T.P., variations in T.P.- Maximization T.P. and prohibited routes.

Assignment Problem- General model of A.P.(A.P. as a special case of a T.P.) Hungarian Method of solving a A.P., variations in a A.P.- maximization, prohibited assignments.

Network Models- Concept of Networks.

UNIT II

Number of Lectures: 18

Weightage: 33%

Unit-2. Sequencing Problem :

Methods of sequencing, Johnson's Algorithm for a two machine problem, three machine problem and M-machine problem, Processing two jobs through m machines

UNIT III

Number of Lectures: 18

Weightage: 33%

Unit-3. Game Theory: Introduction, Two-person zero games, Minimax and Maximin principles, saddle point theorems, mixed strategies, method for solution of 2×2 game, dominance principles, solution of games without saddle points by using dominance and then mixed strategies, graphical method of solving $2 \times m$ and $m \times 2$ game, L.P. solution of games.

REFERENCES BOOKS:

1. Operations Research , by. J.K.Sharma. Macmillan Publishers India Ltd.
2. Operations Research by Nita Shah, Ravi Gor and Hardik Soni, Prentice Hall of India.
3. Operations Research(Principles and Practice) by Pradeep Prabhakar Pai, Oxford University Press.

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	18
Total	100	48

B.Sc Semester VI
PC CMAT IV- Practicals in Mathematics- IV

Objectives:

- Ensure the student can competently use the MATLAB programming environment
 - Understand the capabilities of MATLAB for solving complex mathematical problems
 - Understand the tools that are essential in solving real-world problems applying appropriate Mathematical concept.
-

PCMAT-601

Input-Output Statements in MATLAB

Data input, interactive inputs, reading/storing file data, output commands, formatted input-output functions.

PCMAT-602

Programming Techniques

Loops, Branches control structures, MATLAB programming, function subprograms, types of functions, function handles, errors and warnings, MATLAB debugger.

PCMAT-603

MATLAB Applications:

The content of this unit is to be covered from the list given in Appendix A.

PCMAT-604

Practical using MATLAB programming

List of practical is given in Appendix B.

Text Book:

“MATLAB and its Applications in Engineering” Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson.

coverage from the Text Book:

PCMAT-601

Chapter 5: 5.6

PCMAT-602

Chapter 7: 7.3, Chapter 8: 8.9

PCMAT-603

Appendix A: Table A.1 : A.8

PCMAT-604

Appendix B

Appendix A:

Table A.1

Discrete Math\Number theoretic functions	
Factor	Returns Prime factors
factorial	Factorial function
nchoosek	All combinations of N elements taken K at a time
perms	All possible permutations
gcd	Returns the greatest common divisor.
lcm	Returns the least common multiple.
primes	Generate list of prime numbers
isprime	Returns a logical array that is prime numbers.
rat, rats	Returns a rational fraction approximation.
mod	The mod function is useful for congruence relationships. Returns modulus after
rem	Returns remainder after division.

Table A.2

Coordinate System Conversion	
cart2sph	Transform Cartesian to spherical coordinates
cart2pol	Transform Cartesian to polar coordinates
pol2cart	Transform polar to Cartesian coordinates
sph2cart	Transform spherical to Cartesian coordinates

Table A.3

Interpolation Functions	
interp1	Linear and cubic-spline interpolations of a function of one variable.
interp2	Linear interpolation of a function of two variables.
spline	Cubic-spline interpolation.
unmkpp	Computes the coefficients of cubic-spline polynomials.

Table A.4

Numerical Integration Functions	
quad	Numerical integration with adaptive Simpson's rule.
quadl	Numerical integration with adaptive Lobatto quadrature.
trapz	Numerical integration with the trapezoidal rule.
quadv	Vectorized quadrature
dblquad	Numerically evaluate double integral
triplequad	Numerically evaluate triple integral

Table A.5

Numerical Differentiation Functions	
diff(x)	Computes the difference between adjacent elements in the vector x.
polyder	Differentiates a polynomial, a polynomial product, or a polynomial quotient.

Table A.6

ODE Solvers	
ode23	Nonstiff, low-order solver.
ode45	Nonstiff, medium-order solver.
ode113	Nonstiff, variable-order solver.
ode23s	Stiff, low-order.
ode23t	Moderately stiff, trapezoidal rule solver.
ode23b	Stiff, low-order solver.
ode15s	Stiff, variable-order solver.
odeset	Creates integrator options structure for ODE solvers.
deval	Evaluate solution of differential equation problem
bvp4c	Solve boundary value problems for ODEs

Table A.7

Optimization	
fminbnd	Finds minimum of single-variable function.
fzero	Finds zero of single-variable function.
fminsearch	Multidimensional unconstrained nonlinear minimization
lsqnonneg	Linear least squares with nonnegativity constraints
fminunc	Find minimum of unconstrained multivariable function
fmincon	Find minimum of constrained nonlinear multivariable function
linprog	Solve linear programming problems

Table A.8

Statistical Functions	
erf(x)	Computes the error function $erf(x)$.
mean	Calculates the average.
median	Calculates the median.
std	Calculates the standard deviation.
var	Calculates the variance.
corrcoef	Correlation coefficients
cov	Covariance matrix

Appendix B:

1. Numerical Methods Practical (Lab) using MATLAB programming
2. Calculus
3. Optimization
4. Problems related to programming given in text book.

Assignment: The work should involve programming using MATLAB. The student should submit the electronic copy of .m files or/and diary file showing the execution/output of Matlab session(s).

FCG601-BasicEnglish-VI

RATIONALE: This course is designed to enable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

LEARNINGOUTCOMES:

- Understand the functions and usage of sentence framing, sentence correction and synthesis the sentences
- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms, etc.
- Acquire interest in English language and literature through textbook lessons.
- Acquire writing skill through developing story.
- Acquire the speaking skill through speeches.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15marks and End Term Examination conducted by University examination for 35marks.

Subject Code	Subject Title	Credits	Theory			TotalMarks
			Hrs.	Max Marks		
				MidTerm	EndTerm	
FCG-602	Basic English-VI	2	24	15	35	50

Unit-I	Number of lectures: 8	Weightage: 33%
Lesson 2 : <i>Between the Mosque</i>		
Lesson 7 : <i>My Financial Career</i>		
Lesson 8 : <i>Speech on Indian Independence</i>		
Poem 14 : <i>The World is Too Much with us</i>		
Poem 15 : <i>Success is Counted Sweetest</i>		
Poem 16 : <i>I, Too, Sing America</i>		
The Joy of Reading selected Prose & Poetry		

Unit- II	
Number of lectures:4	Weightage: 17%
Grammar	
<ul style="list-style-type: none"> - Transformation , Correction (Articles, prepositions, Tenses, Concord) - Synthesis of Sentences 	
Unit-III	
Number of lectures: 8	Weightage: 33%
Developing a Story	
Unit-IV	
Number of lectures: 4	Weightage: 17%
Preparing Speeches	
<ul style="list-style-type: none"> - Introducing Chief Guest - Farewell Speech - Speech on annual functions - Mourning the Death of VIP - Speech on Republic Day 	

REFERENCES

1. High School English Grammar – Wrenn& Martin
2. Contemporary English Grammar– David Green

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	33	8
Unit II	17	4
Unit III	33	8
Unit IV	17	4
Total	100	24

GENERIC ELECTIVE

EGC601-Advanced Communication Skills

RATIONALE: This course is designed to enable students to acquire basic understanding of Phonetics. The students would be made familiar with the stress, punctuation and fluency of English words and sounds. The course would help students to know the sentence patterns and grammatical structures.

LEARNING OUTCOMES:

- To build confidence for communicating in English and create interest for the life-long learning of English language
- To describe and characterize spoken English both from the grammatical and the discourse perspectives.
- To describe guidelines and identify the difficulties Indian students and users of English as a foreign language have in the use of the English language in oral contexts.
- To draw comparisons between oral and written language through the use of representative oral and written language.

TEACHING AND EVALUATION SCHEME:

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credit	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EGC - 601	Advanced Communication Skills	2	24	15	35	50

COURSE CONTENT

Unit-I Number of lectures: 12 Weightage:50% Basics of Listening: (a) Listening Ability (b) Hearing and Listening (c) Types of Listening (d) Barriers to Effective Listening
Unit-II Number of lectures: 12 Weightage:50% Writing Skills: (a) Resume writing (Application Que) (b) Business Letters (Application Que) (c) Report Writing (Application Que) (d) E-mail etiquettes

RECOMMENDED READING:

1. V. Sasikumar : A Course in Listening and Speaking – I, Cambridge Uni. Press
2. G. Taylor:English Conversation Practice, Tata Mcgraw-Hill Publishing Co. Ltd.
3. Wrenn&Martin:High School English Grammar & Composition, S, Chand Pub.
4. Kumar S and Lata P Communication Skills 2011: New Delhi Oxford University Press

INSTRUCTION STRATEGIES

1. Interactions with the students understand the level of students.
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Powerpoint presentation), Notes, References, Copy of Articles, Models, diagram.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Subjective Elective

EMAT- 601, Business Mathematics- IV

RATIONALE: This course is designed to enable students to acquire understanding about the basic principles of business mathematics

LEARNING OUTCOMES:

- Develop an understanding of the logical statements
- Understand the concept of permutation and combinations

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EMAT- 601	Business Mathematics- IV	2	24	00	50	50

COURSE CONTENT

Unit:1 Logic: [only examples]

Number of lectures: 12

Weightage: 50%

Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contradiction
Negation of Compound statements, Propositions, Conditional and Bi Conditional statements.

Set Theory: [only examples] Definition and methods of sets, types of sets, Venn diagrams,
Operations on sets, De-Morgan's law, Finite and infinite sets.

Unit:2 Permutations and Combinations: [only examples]

Number of lectures: 12

Weightage: 50%

Fundamental rules of counting, Definition of Permutations and Permutation of n different things,
Permutation of repeated things, Circular Permutation, Definition of Combination standard results
and examples.

Reference books:

(1) Business Mathematics, D.C. Sancheti & V.K. Kapoor, Sultan Chad & Sons Publication, New Delhi.

(2) Business Mathematics, B.S. Shah Prakashsan, Ahmedabad.

Teaching Instructions:

1. Interactions with the students to understand the level of students
2. Explaining & discussing mathematics formulas and derivations.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

EXAMINATION PATTERN
KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR

B.Sc. Physics, Semester V/VI, End Term Examination,

Month-Year

Subject: Code-Title

Time: 3 hrs

Date

Maximum marks: 70

Que. No : 1	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 2	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 3	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 4	Write any Ten out of Twelve (Four questions to be asked from each unit) Short question/MCQ/Short numerical/Diagram/Match the following, True or False, Fill in the blanks	10 Marks
Total marks		70 marks

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR
B.Sc. Semester V/VI, END TERM Examination,
Month-Year
Subject: Subjective Elective/Generic Elective

Time: 2 hrs

Date

Maximum marks: 50

Que. No : 1	Attempt any three out of Four (Descriptive)	21 Marks
Que. No : 2	Attempt any Four out of six (Short Notes)	20 Marks
Que. No : 3	Attempt any Three out of Four (Very Short Answers)	09 Marks
Total marks		50 marks