

*Faculty of Engineering  
Scheme of Instruction and Syllabi*

*of*

**BE I - IV YEAR**

**OF**

**FOUR YEAR DEGREE COURSE**

**IN**

**CIVIL ENGINEERING**

*(With effect from the Academic Year 2013-2014)*



**July 2013**

**Osmania University  
Hyderabad - 500 007.**

**RULES & REGULATIONS  
FOR THE FOUR YEAR DEGREE COURSE IN  
ENGINEERING / INFORMATION TECHNOLOGY**  
*(Applicable to students admitted during  
Academic year 2010-11 onwards)*

**Note :** All the rules and regulations, hereinafter specified shall be read as a whole for purpose of interpretation.

**PART-I ADMISSION**

1. A candidate for admission to the Four Year Degree Course in Engineering must have passed the Intermediate Examination of the Board of Intermediate Examination, Government of Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects, or any examination recognised by the Osmania University as equivalent thereto.
2. All the eligible applicants for admission into First year shall have to qualify the EAMCET Examination conducted by the Govt. of A.P. The candidate will be admitted strictly in accordance with the merit secured at the Entrance Examination keeping in view the rules in force regarding the reservations of seats of various categories of candidates. Diploma qualified candidates will be considered for admission into the first year if desired on the rank obtained in ECET within the seats allotted to such category.
3. Diploma qualified candidates seeking admission into the Second year under lateral entry scheme shall have to qualify in the ECET examination of the concerned branch.
4. Candidates admitted under Management / NRI quota will be governed by the rules specified by the Govt. of Andhra Pradesh from time to time.

**PART - II DURATION AND BRANCHES OF STUDY**

1. The duration of the course is four years. The first academic year shall comprise of :

Instruction..... 30 Weeks (Minimum)

Each of the subsequent three academic years shall be divided into two semesters hereinafter referred to as the First semester and Second semester in chronological order. Each semester shall comprise of :

Instruction ..... 15 Weeks (Minimum)

No readmission / admission / promotion can be made after 8 weeks of the commencement of instruction for First year, (Year Wise Scheme), and after 4 weeks from the commencement of instruction of semester in II, III and IV years (Semester Scheme) respectively. In case there are any court cases consequent to which the Convenor of Admissions / Principal is compelled to admit a student after the announced last date of admissions, the admission (seat) of such student be reserved for the subsequent year on a supernumerary basis.

No make - up / supplementary or any other examinations except the internal tests shall be conducted during the instruction period of the Semester course, except for the IV year II semester course.

2.a) The following courses of study are provided under the Faculty of Engineering.

- |  |  |
|--|--|
| i) Biomedical Engineering                  | ii) Civil Engineering                    |
| iii) Computer Science & Engineering        | iv) Electrical & Electronics Engineering |
| v) Electronics & Communication Engineering | vi) Instrumental Engineering             |
| vii) Mechanical Engineering                | viii) Production Engineering             |

b) The Information Technology course is provided under the Faculty of Informatics.

3. Each candidate will be allotted to one of the course at the time of admission strictly depending on the merit secured at the Entrance Examination and subject to the rules in force regarding reservations of seats.

- a) Candidates of the Four year degree course who fail to fulfil all the requirements for the award of the degree as specified hereinafter within eight academic years from the time of admission, will forfeit their seat in the course and their admission will stand cancelled.
- b) Diploma candidates admitted to the second year under lateral entry scheme shall fulfill all the requirements for the award of the degree as specified hereinafter within six academic years from the time of admission failing which they will forfeit their seat in the course and their admission will stand cancelled.

### PART-III AWARD OF DEGREE

1. The Degree of Bachelor of Engineering will be conferred on a candidate who has pursued a 'Regular Course of Study' for four academic year (three academic year for candidates admitted in II year under lateral entry scheme) as hereinafter prescribed in the scheme of instruction and has passed all the examinations prescribed in the scheme of examination.
2. i) A regular course of study for eligibility to appear at the B.E. Examination of any year or semester shall mean putting in attendance of not less than 75% aggregate in lectures, practicals, drawing, workshops, field work, project, seminars extension etc., in subjects listed in the scheme of instruction. The cumulative monthly attendance in each subject and the aggregate attendance shall be displayed on the notice board.
  - ii) Attendance at N.C.C. Campus or Inter Collegiate or Inter University or Inter-State or International matches or debates or Educational excursion or such other Inter - University activities as approved by the authorities, involving journeys outside the city in which the college is situated, will not be counted as absence. However, such absence should not exceed (4) weeks of the period of instruction, in a semester.
  - iii) In any year / semester of the course if a candidate fails to secure the minimum percentage of attendance, he / she shall not be eligible to appear in the examination of that year / semester and he/she shall have to enroll himself/herself to undergo afresh a 'Regular Course of Study' of the corresponding year / semester in subsequent academic session, in order to become eligible to appear for the examination.
  - iv) The attendance shall be calculated from the date of commencement of the classes as per the almanac communicated by the University.
  - v) The candidates of the First Year courses who have put in not less than 40% of attendance, can seek readmission to fulfil the attendance requirement, without appearing for the Entrance Test during subsequent year, and such admission shall be treated as supernumerary.
  - vi) In respect of others who have put in less than 40% attendance in the First year, they have to seek admission afresh going through the Entrance test along with fresh candidates.

3. If a candidate who has pursued a Regular Course of Study of any year / semester wishes to undergo the same course again, he / she may be permitted to enroll again as a regular student for the course of the year / semester, when next offered, depending on the availability of seats, provided that he / she undertakes to forego his / her attendance secure him/her for that year / semester previously and provided further that he/she has not pursued a 'Regular Course of Study' in any higher semester. For the award of division, however, he /she shall have the benefit of the higher of the aggregate marks secured in that year / semester.

#### PART IV - SCHEME OF INSTRUCTION AND EXAMINATION

1. Instruction in the various subjects in each year / semester shall be provided by the college as per the scheme of instruction and syllabus prescribed.
2. The First year of the B.E. Course shall be on the annual examination pattern. The second, third and fourth year shall be on the semester pattern.
3. The distribution of marks of sessionals based on the internal assessment by concerned teacher and that for University Exam shall be as follows :

Subject	Sessional	Univ. Exam
i) Each theory subject	25*	75**
ii) Each practical or drawing subject for which less than (6) periods per week are provided in the scheme of instruction.	25*	50
iii) Each practical or drawing subject for which (6) Periods per week are provided in the scheme of instruction.	50	100
iv) Project	50	Excellent / Very Good / Good / Satisfactory / Unsatisfactory

\* 5 Marks be allotted for assignments in the subject out of the 25 sessional marks, the rest being based on Internal Tests. There shall be three internal tests for 1st year and 2 internal tests for 2nd year onwards (Semester) each of 20 marks. Average of all three tests should be taken for year wise course and average of two tests should

be taken for semester course. For subjects where the sessional marks are 50, the assignment will carry 10 marks weightage and internal tests weightage will of 40 marks.

\*\* The question paper will be of two parts. Part A and Part B. Part A is compulsory and should cover the entire syllabus, and carries 25 marks. The questions should be of 2 or 3 marks each and 10 questions are to be set. Part B will comprise of seven (7) questions. There has to be one question in each unit of the syllabus and the remaining two questions may be from the total syllabus of all 5 units. However, there should not be more than 2 questions from any unit.

4. The programme of instruction, examination and vacations shall be notified by the Dean, in consultation with University.

5. The medium of instruction and examination shall be English.

**Note :** To enable the B.E. final year students to complete the course requirements intime, there shall be make - up exams for IV year II semester only, within one month of publication of results of IV year II semester main examinations.

6. The examinations prescribed may be conducted by means of written papers, practicals and oral tests, inspection of certified sessional work in drawing and laboratories and workshop or by means of any combination of these methods as may be deemed necessary.

7. All the general rules for examination (given under Partg VIII Rules 23 to 29) shall be adhered to.

8. A candidate shall be deemed to have fully passed the Examination of any year / semester, if he/she secures not less than minimum marks as hereinafter prescribed.

Minimum Pass Marks in the University Examination shall be :

Each theory subject 40% of Univ. Exam

Each Practical subject/project 50% of Univ. Exam

Overall aggregate of Univ. Exam & Sessional marks of a Semester 40%

There shall however be no minimum for the sessional marks secured by a student in a subject or in all the subjects put together.

9. If a candidate in any year/semester/examination of the course fails to secure the minimum marks in any subjects, then he/she shall have to appear only in the failed subject/s of the semester.

## PART V - RULES OF PROMOTION

1. Rules of promotion are as under :

S.No.	Semester / Class	Conditions to be fulfilled for
1.	From BE I year to I Sem of BE II year	a) Regular course of study of BE I year b) Must have passed atleast 50% of papers prescribed of BE I year. The number of paper a candidate can have as backlogs is as under.

No. of papers prescribed for BE I year	No. of backlogs permitted
9	5
10	5
11	6

2. From I Sem. of BE II Yr. to II Sem of BE II Year
3. From BE II Yr. II Sem. to BE III Yr. I Sem.
- a) Regular course of study of I Sem. of II year.
- a) Regular course of study of II Sem to of BE II year.
- b) No. of backlogs, if any of BE I & BE II years put together shall not exceed 50% of the total number of papers prescribed for the I & II Semester of BE II year.

No. of papers prescribed for I & II Sem. of BE II year	No. of backlogs permitted in I & II Year put together
12	6
13/14	7
15/16	8
17/18	9

4. From I Sem. of BE III Yr. to II Semester of III Year
- a) Regular course of study of I Sem. of BE III year.

5. From II Sem. of BE III Yr. to I Semester of IV Year.
- a) Regular course of study of II Sem. of BE III year.
- b) No. of backlogs, if any of BE I, BE II & III years put together shall not exceed to 50% of the total number of papers prescribed for the I & II Semester of BE III year.

No. of papers prescribed for I & II Sem. of BE III year	No. of backlogs permitted in BE I & III Year put together
14	7
15/16	8
17/18	9

5. From I Sem. of BE Yr. II Sem.
- Regular course of study of BE IV year I Semester

## PART VI - AWARD OF DIVISION

1. Candidates who have passed all the examinations of the B.E. Degree Course shall be awarded one of the following divisions in accordance with the marks secured by them in all 1 year and all the I and II semester examinations of II, III and IV years taken together.

**I-Division :** 60% and above (I Division with Distinction shall be awarded to those who have secured 70% and above and who have passed all subjects in each semester which are reckoned for the award of division. Candidates who have not passed the examinations in first attempt are not eligible for getting Rank Certificate / Gold Medal).

**II-Division :** 50% and above but less than 60%

**Pass Division :** 40% and above but less than 50%

The marks secured for the sessional work and at the University Examination in each subject, shall be shown separately in the memorandum of marks.

## **PART - VII IMPROVEMENT OF DIVISION**

1. A candidates who wishes to improve his/her division may do so within one academic year immediately after having passed all the examination of BE Degree Course by reappearing at not more than two semesters (All subjects pertaining to the semester taken together) examinations. For the award of division, he/she will have the benefit of the higher of the two aggregates of marks secured in the corresponding semesters).
2. In case of candidates who have secured less than 40% of the total aggregate (of I, II, III and IV years), needed for a Pass Division, the candidate can appear for improvement in individual subjects to become eligible for a PASS Division.

## **PART VIII - GENERAL RULES OF EXAMINATION**

1. All examinations of the Osmania University shall be held at such places as it may be decided and at such other centres on such dates as may be notified.
2. Application for permission to appear at every examination shall be made on the prescribed form accompanied by three passport size full face photographs (not profile) which along with the necessary certificates regarding attendance, practical work etc., and the prescribed fee, should be sent to the Controller of Examinations on or before the date fixed for this purpose.
3. When a candidate's application is found in order and he/she is eligible to appear at an examination, the Controller of Examinations, shall furnish him with a Hall Ticket with the photographs attached to it, enabling the candidate to appear in the Examination, and this Hall Ticket shall have to be produced by the candidates before he/she can be admitted to the premises where the Examination is being held or to a part of the said premises as well as to the Examination Hall.
4. A candidate who fails to present himself / herself for the Examination for any reason whatsoever, excepting shortage of attendance or who fails to pass the examinations, shall not be entitled to to claim refund of the whole or any part of the examination fee, nor for the reservation of the examination fee for a subsequent examination or examinations.

5. A candidate after he/she been declared successful in the whole examination shall be given certificate setting forth the year of examination, the subjects in which he/she was examined and, the division in which he/she was placed.
6. No candidate shall be allowed to put in attendance for or appear at Examinations for different degrees and different faculties at one and the same time.
7. Students who have appeared once at any examination of the Course, need not put in fresh attendance, if they want to reappear at the corresponding Examinations, notwithstanding the fact that new subjects may have been introduced by the University. They will however, have to appear at the examinations according to the scheme of Examination and Syllabus in force.

## **PART IX - TRANSITORY REGULATIONS**

1. Whenever, course or scheme of instruction is changed in a particular year, two more examinations immediately following thereafter, shall be conducted according to the old syllabus/regulations. Candidates not appearing at the examinations or failing in them shall take the examination subsequently according to the changed syllabus/ regulations.

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**SCHEME OF INSTRUCTION & EXAMINATION**

**B.E. I - YEAR (FULL TIME)**

**SEMESTER - I**

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration In Hours	Maximum Marks	
			L	D/P		Univ. Exam	Sessi-onals
		<b>THEORY</b>					
1.	EG 101	English	3	-	3	75	25
2.	MT 101	Mathematics - I	3	-	3	75	25
3.	MT 102	Mathematics - II	3	-	3	75	25
4.	PH 101	Engineering Physics	3	-	3	75	25
5.	CH 101	Engineering Chemistry	3	-	3	75	25
6.	CS 101	Programming in C & C++	3	-	3	75	25
7.	CE 101	Engineering Mechanics	3	-	3	75	25
8.	CE 102	Engineering Graphics	-	6	3	100	50
		<b>PRACTICALS</b>					
1.	PH 132	Physics Lab	-	3	3	50	25
2.	CH 132	Chemistry Lab	-	3	3	50	25
3.	ME 131	Workshop Practice	-	3	3	50	25
4.	CS 131	Programming Lab	-	3	3	50	25
5.	EG 131	English Language Lab	-	2	3	50	25
		<b>TOTAL</b>	<b>21</b>	<b>20</b>	<b>-</b>	<b>875</b>	<b>350</b>

**EG 101 UE**

**ENGLISH (THEORY)**

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

**UNIT-I**

Effective Communication : Role and importance of communication; Features of human communication; Process of communication; Types of communication: Verbal - formal versus informal communication, one way versus two-way communication; Non-verbal communication; Barriers to communication; Importance of listening in effective communication.

**UNIT-II**

Oral communication: Importance of oral communication; Seminar skills; Speech-making: Types of speeches; Situational dialogues; Speaking strategies; Interpersonal Communication, Models of interpersonal development - Johari Window; Styles of communication, persuasion techniques; Team work.

**UNIT-III**

Written Communication : Paragraph writing; Report writing; Types of reports, Writing technical reports and scientific papers; Communication through letters; official and personal letters, letters of complaint, letters of enquiry and responses, resume writing; cover letters, memos, circulars, notices, minutes of meeting, writing a statement of purpose, e-mail etiquette.

**UNIT-IV**

Remedial English : Common errors, words often confused, tense and aspect, articles, prepositions, connectives and correlative conjuncts, voice, concord, direct and indirect speech, question tags, punctuation, homonyms, homophones, synonyms, antonyms, one-word substitutes; Idiomatic usage.

**UNIT-V**

Reading comprehension, reading strategies.  
The following four lessons are prescribed :

1. Barack Obama : A Trendsetter
2. Rendezvous with Indra Nooyi
3. Muthyala Raju Revu : An Engineer Turned IAS Officer.
4. R. Madhuvan : Engineering to Farming.

**Note :** Units I and V are from the book 'Essential English', Unit-III is from Communication Skills & Soft Skills and Units-II and IV are from both Essential English and Communication Skills & Soft Skills.

**Suggested Reading :**

1. E. Suresh Kumar et al., *Essential English*, Oriental Blackwan, 2010.
2. E. Suresh Kumar et al., *Communication Skills and Soft Skills*, Pearson, 2010.
3. Meenakshi Raman et al, *Technical Communication*, Oxford University Press, 2009.
4. K.K. Ramachandran et al., *Business Communication*, Macmillan, 2009.
5. Sunitha Mishra, C. Murali Krishna, *Communication Skills for Engineers*, Pearson, 2004.

**MT 101**

**MATHEMATICS - I**

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	† 25 Marks

**UNIT-I**

**Differential Calculus :**

**Rolle's theorem** - Mean value theorems - Taylor's series - expansion of functions on power series - curvature - radius of curvature (Cartesian, polar and parametric co-ordinates) Envelopes - Evolutes and Involutives.

**UNIT -II**

**Functions of Several Variables :**

Tracing of curves in Cartesian and polar coordinates - Limits and continuity of functions of two variables - partial derivatives - Total differentials and derivatives - Approximation by total differential - Derivatives of composite and implicit functions - Higher order partial derivatives - Homogeneous functions - Taylor's theorem for functions of two variables - Maxima and minima of functions of two variables with constraints - Lagrange's method Jacobian - change of variables.

**UNIT-III**

**Vector Calculus :**

Multiple Integrals : Double and triple integrals - change of order of integration - scalar and vector fields - Vector differentiation - Directional derivative - Gradient of a Scalar field - Divergence - Curl of vector field - Line - Surface and volume integrals - Green's theorem - in a plane - Gauss's divergence theorem - Stoke's theorem (without proofs) and their applications.

**UNIT-IV**

**Matrix Theory:**

Elementary row and column operations on a matrix - Rank of a matrix - Solution of system of linear equations - Linear dependence and independence of vectors - Characteristic equation - Characteristic roots and vectors - Caley - Hamilton theorem - Reduction to diagonal form and normal form - Reduction of a quadratic form into canonical form.

## UNIT-V

### Infinite Series :

Sequence - Infinite Series - Convergence and divergence - Comparison test - Ratio test, Cauchy's test - Raabe's test - Logarithmic series test - Alternating series - Absolute convergence - Conditional convergence.

### Suggested Reading :

- 1) R.K. Jain and S.R.K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, Third edition, 2009.
- 2) B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 40th edition, 2007.
- 3) M. Venkata Krishna and G. Shanker Rao, *A text book of engineering Mathematics*, Jaico Publishing House, Mumbai, 2010.
- 4) M.K. Venkatraman, *Engineering Mathematics - I*, Technical Publisher, Chennai.
- 5) H.C. Taneja, *Advanced Engineering Mathematics*, Vol. I & II, I.K. International Publishing Pvt. Ltd., New Delhi, 2007.

## MAT 102

### MATHEMATICS - II

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### UNIT-I

#### Ordinary Differential Equations of first order :

Introduction to differential equations : Solutions of differential equations - Exact first order differential equations - Integrating factors - Linear first order equations - Bernoulli's equations - Ricatti's equation - Clairut's equation - Orthogonal trajectories of a given family of curves, L-R circuits - LCR circuits - Simple Harmonic Motions.

### UNIT-II

#### Linear Differential Equations :

Solutions of linear differential equations - Methods for solutions of linear equations - differential operator - Solutions of second order linear homogenous equations with constant coefficients - Method of reduction of order for variable coefficients - solutions of higher order homogenous linear equations with constant coefficients - Solutions of non-homogenous linear equations - Method of variation of parameters.

### UNIT-III

#### Series solution of differential equations :

Introduction - Ordinary and singular points of an equation - Power series solution - Frobenius method - Special differential equations - Legendre's differential equations and its series solution - Rodrigue's formula - Generating function for Legendre's polynomials - Recurrence relations for Legendre's polynomials - Orthogonal property of Legendre polynomials - Chebyshev polynomials - Zeros and extreme points  $T_n(X)$  - Orthogonal properties of Chebyshev polynomials - Recurrence formulae for  $T_n(X)$  and  $U_n(X)$ .

### UNIT-IV

Special function - Beta function - Relation between Gamma function and Beta function - Error function - Bessel's differential equation and its solution - Bessel's function and its generating functions.

## UNIT-IV

### Laplace Transforms :

Laplace Transforms - Inverse transforms - Properties of Laplace transform - Laplace transform of unit step function - Impulse function and periodic functions - Convolution theorem - Solution of ordinary differential equations with constant coefficients using Laplace transform.

### Suggested Reading :

- 1) R.K. Jain and S.R.K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, Third edition, 2009.
- 2) B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 40th edition, 2007.
- 3) M. Venkata Krishna and G. Shanker Rao, *A text book of engineering Mathematics*, Jaico Publishing House, Mumbai, 2010.
- 4) M.K. Venkatraman, *Engineering Mathematics - II*, Technical Publishers, Chennai.
- 5) H.C. Taneja, *Advanced Engineering Mathematics*, Vol. I & II, I.K. International Publishing Pvt. Ltd., New Delhi, 2007.

## PH 101

### ENGINEERING PHYSICS

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

### UNIT-I Physical Optics and Lasers (24 Periods)

- 1.1 Interference - Coherent and non-coherent sources, division of amplitude and division of wave front, Interference in thin films (reflected light) - Newton's rings
- 1.2 Diffraction - Distinction between Fresnel and Fraunhofer diffraction, diffraction at a single slit - between slit diffraction - diffraction grating (N-slits).
- 1.3 Polarization - Introduction - Malus law, double refraction, Nicol's prism, quarter wave and half wave plates - optical activity - Laurent's half shade polarimeter.
- 1.4 **Lasers and holography** : Characteristics of Lasers - Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby laser - Helium - Neon Laser - Semiconductor Laser - Applications of lasers, Basic principles of holography - Construction and reconstruction of image on hologram - Applications of holography.
- 1.5 **Fiber Optics** : Introduction - Types of optical fibres - propagation of light through an optical fiber - Critical angle - Acceptance angle - Numerical aperture (NA) - Types of optical fibers and refraction index profiles - fibre drawing process (double crucible method) - Application of optical fibers.

### UNIT-II Modern Physics (16 Periods)

- 2.1 **Elements of Statistical Mechanics** : Concepts of phase - space, derivation of  $S = k \log W$ , Types of ensembles - Maxwell - Boltzmann statistics, Bose - Einstein statistics, Fermi-Dirac statistics - photon gas - Planck's law of black - body radiation distribution - Rayleigh Jeans law and Wein's law.
- 2.2 **Wave mechanics** : Wave function and Schrodinger time dependent

and time independent wave equations - particle in an Infinite Square well (particle in a box) potential, potential barrier and quantum tunneling.

- 2.3 **Electromagnetic theory** : Review of steady and varying fields conduction and displacement current, Maxwell's equations in integral and differential forms, electro magnetic waves, plane wave and Poynting vector.

### UNIT-III Condensed matter physics (18 periods)

- 3.1 **Crystallography** : Introduction - Space lattice - Basis - Unit cell - Bravais lattices and crystal systems - atomic radius, coordination number effective number of atoms per unitcell, packing fraction simple cubic - Body centered cubic - Face centered cubic crystals - Miller Indices - Bragg's law, Experimental determination of lattice constant by powder diffraction method, Classification of defects in crystals - line defects, point defects and volume defects - number of point defects in metals - concentration of Schottky defects and Frankel defects in a crystal - Glasses - Characterizing properties.
- 3.2 **Band Theory of Solids** : Classical free electron theory (qualitative Energy band formation in solids - Kronig - Penney model (qualitative treatment) - Electron gas - Fermi energy and Fermi level in metals - Classification of solids into good conductors, semiconductors and bad conductors.
- 3.3 **Semiconductors** : Intrinsic and Extrinsic semiconductors- concept of hole-Concept of Fermi level in semiconductor - carrier concentration in intrinsic semiconductors - conductivity in intrinsic semiconductors - Hall effect - LED - Thermistor.

### UNIT-IV Materials Science (18 periods)

- 4.1 **Dielectric materials** : Dielectrics - types of dielectric polarizations. Electronic, ionic, orientation and space-charge polarization - Frequency and temperature dependence of dielectric polarizations - Ferroelectricity - Barium titanate - Determination of dielectric constant by capacitance Bridge method-Applications of Ferroelectrics.
- 4.2 **Magnetic Materials** : Classification of magnetic materials - dia, para, ferro, anti ferro and ferrimagnetism - Weiss molecular field theory of ferromagnetism - magnetic domains - hysteresis curve - Soft and hard magnetic materials - Ferrites structure - spinel and inverse spinel and applications of ferrites.

- 4.3 **Superconductivity** : Superconductivity - General properties of superconductors - Meissner effect - Type I and Type II superconductor's - BCS Theory (in brief) - high T<sub>c</sub> superconductors (in brief) and their preparation - Applications of superconductors.

### UNIT-V Materials at Reduced size and Characterization Techniques (14 periods)

- 5.1 **Thin film** : Distinction between bulk, thin films and nano materials - Thin film preparation techniques-physical vapor deposition (PVD) - thermal evaporation - electron beam evaporation - sputtering and chemical vapour deposition (CVD) - applications of thin - solar cell.
- 5.2 **Nanomaterials** : Zero dimensional materials. Properties of materials at reduction size - nano scale surface to volume ratio-quantum confinement-preparation of nano materials-bottom-up methods-sol gel, pulsed laser, sputtering and CVD (Qualitative) - Top-down methods - ball milling - elementary ideas of Carbon nanotubes - Applications.
- 5.3 **Experimental techniques** : X-ray diffraction-X-ray fluorescence-Auger (OJ) process - atomic force microscopy (basics) - electron microscope (SEM and TEM).

#### Suggested Reading :

- 1) M.S. Avadhanulu and P.G. Kshirasagar, *Engg. Physics*, S.Chand 1st edition, 1992.
- 2) R.K. Gaur and S.L. Gupta, *Engg. Physics*, Dhanpath Rao, 7th edition, 2005.
- 3) A.K. Bhandhopadhyaya, *Nano Materials*, New Age International, 1st edition, 2007.
- 4) V. Rajendran, *Engineering Physics*, Tata McGraw Hill, 1st edition, 2008.

#### Reference Books :

- 1) M. Armugam, *Materials Science*, Anuradha Agencies.
- 2) R. Murgashaam, *Modern Physics*, S. Chand and Co.,
- 3) J.M. Senior, *Optical Fibre Communication*.
- 4) A. Goswami, *Thin film fundamentals*, New Age International.
- 5) C.M. Srivastava and C. Srinivasan, *Science of Engg. Materials*, New Age International.

## CH 101

## ENGINEERING CHEMISTRY

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

**UNIT - I : ELECTROCHEMISTRY****1.1 Electrodes :**

Electrode Potentials - Standard Electrode Potentials - SOP & SRP. Electrochemical series-significance. Types of Electrodes (a) Gaseous Electrode (Hydrogen electrode) (b) Metal ion ( $Zn/Zn^{2+}$ ) (c) Redox Electrode (Quinhydrone Electrode) (d) Metal - Insoluble salt Electrode (Calomel Electrode) - Nernst equation and its derivation and applications. Reversible and Irreversible cells : EMF of electrochemical cells-cell notation and cell reaction - Numerical Problems.

**1.2 Battery Chemistry :**

Primary batteries : Zinc-Carbon battery. Secondary batteries Lead - acid battery, Nickel - Cadmium and Lithium - Ion batteries - Charging and Discharging reactions and applications. Fuel Cells : Concept of fuel cells, Methanol-Oxygen fuel cells.

**1.3 Electro Analytical Techniques**

Principle, Method and Applications of the following techniques

Conductometry : Acid - Base titrations

Potentiometry : Acid - Base and Redox titrations

pH metry : Acid - Base titrations.

**UNIT - II THERMODYNAMICS AND PHASE RULE :****2.1 Thermodynamics :**

The Concept of Reversible and Irreversible processes. Work done in Isothermal & Adiabatic reversible and irreversible processes.

Success and limitations of First law of Thermodynamics. The need for Second law of thermodynamics. Statements of Second law of thermodynamics. The Carnot Cycle. Heat engine and its efficiency. Carnot theorem. The concept of entropy. Criteria for spontaneity of a process in terms of entropy. Entropy changes in reversible processes. Physical significance of entropy. Gibbs and Helmholtz energies and their

significance. Conditions of equilibrium and spontaneity in terms of free energy. Variation of free energy with temperature and pressure. Gibbs-Helmholtz equation and its applications - Numericals.

**2.2 Phase Rule :**

Definition of terms phase, components and degrees of freedom. Statement of Phase rule. Phase rule equation and its applications to one component system - water system and two components system- Pb-Ag system. Pattinson's Process of desilverization of lead.

**UNIT - III : CORROSION AND WATER CHEMISTRY****3.1 Corrosion and its control :**

Causes and effects - Types of corrosion - Chemical (dry) and electrochemical (wet) corrosion - Mechanism of electrochemical corrosion - Formation of anodic and cathodic areas - Galvanic corrosion, differential aeration corrosion (waterline and pitting corrosion).

Factors affecting the rate of Corrosion (a) Position of metals in Galvanic Series, (b) Relative areas of anode and cathode, (c) Nature of corrosion product, (d) Temperature (e) Humidity and (f) pH.

Corrosion Control Methods : Cathodic Protection - Sacrificial Anode and Impressed Current Methods.

**3.2 Surface Coating :**

Types of Metallic Coatings, Anode and cathodic Coatings - Methods of Applications of metallic coatings - Electroplating (Nickel Plating) & Electroless plating (Copper Plating) Paints - constituents and their functions.

**3.3 Water Chemistry :**

Hardness of water types - units of hardness - determination of temporary & Permanent Hardness of water by EDTA Method (numerical problems) - Alkalinity of Water & its determination - water softening by Ion - exchange and reverse osmosis methods - specification of potable water. Disinfection of drinking water by chlorination- Break point Chlorination and Ozonization - Boiler troubles : Causes & effects.

**UNIT-IV MATERIAL Chemistry****4.1 Polymers :**

Definitions of the terms : Monomer, Polymers, Nomenclature : Homo-Hetero and Copolymers. Tacticity of polymers. Types of Polymerization (i) Addition (ii) Condensation (iii) Co-Polymerisation - Examples.

Thermoplastics & Thermosetting resins.

#### Types of Polymers :

- (i) **Plastics** : Preparation, Properties & uses of PVC (Plasticized and unplasticized) Teflon and Bakelite.
- (ii) **Fibers** : Preparation, Properties & uses of Kevlar and Polyurethanes (perlon-U).
- (iii) **Rubbers/Elastomers** : Natural rubber and its chemical structure. Vulcanization and its significance. Preparation, Properties & Uses of Buna-S. Butyl Rubber and Silicone Rubbers.

**4.2. Biodegradable Polymers** - Concept and significance - Polyactic acid.

#### 4.3 Conducting polymers :

Definition, Classification into extrinsic and intrinsic polymers. Mechanism of conduction in polyacetylene. Structure of polyaniline and its doping. Applications of conducting polymers.

#### 4.4 Composite Materials :

Definition : Types of composites (Fibre reinforced, glass fibre reinforced carbon fibre reinforced) - Advantages.

#### 4.5 Nanomaterials :

Introduction : Production methods and applications of Graphite, fullerene and Carbon nanotubes.

### UNIT-V : CHEMICAL FUELS

#### 5.1 Fossil fuels

Classification of fuels, primary, secondary - solid, liquid and gaseous fuels requirements of a good fuel. Determination of Calorific value by Bomb Calorimeter - HCV, LCV Theoretical calculation of calorific value by Dulongy's formula - numericals. Combustion - Ignition temperature of a fuel, calculation of Air quantities by Weight and volume required for combustion of a fuel Numerical problems.

Solid Fuels : Coal and its chemical composition, Proximate and Ultimate analysis. Liquid Fuels : Fractionation of Petroleum. Composition and uses of - Gasoline, Diesel and Kerosene. Cracking & its Significance - Catalytic cracking by fixed bed method, Knocking, Fuel rating - Octane and Cetane numbers. Unleaded Petrol - Composition and significance. Automobile Exhaust - Catalytic Converters. Gaseous Fuels - LPG, CNG composition and uses.

#### 5.2 Bio Diesel

Sources : Concept of Trans esterification. Properties and significance

#### 5.3 Rocket Fuels :

Principles of rocket propulsion, Characteristics of a good propellant Classification of rocket fuels.

#### Suggested Reading :

- 1) Puri, Sharma and Pathania, *Principles of Physical Chemistry*.
- 2) P.L. Soni and O.P. Dharmarha, *Text Book of Physical Chemistry*. S. Chand & Sons, New Delhi.
- 3) PC Jain and M Jain, *Engineering Chemistry*. Dhanpat Rai & Sons (15th Edn), New Delhi.
- 4) CP Murthy and A Naidu, *Engineering Chemistry*. B.S. Publications, Hyderabad.
- 5) JC Kuriacose and J Rajaram, *Chemistry in Engineering and Technology*, TMH, New Delhi.
- 6) O.G. Palanna, *Engineering Chemistry*. TMH and New Delhi.
- 7) S.S. Dara, *Engineering Chemistry*. S Chand & Sons, New Delhi.
- 8) Sashi Chawla, *Engineering Chemistry*. Dhanpat Rai & Sons, New Delhi.

## CS 101

## PROGRAMMING IN C &amp; C++

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

## UNIT-I

**Introduction of Computers :** Components, Block diagram, Operating Systems, Programming Languages, Assembler, Interpreter, Compiler, Loader, Linkers. Number Systems (Binary, Octal), Decimal and Hexal), Representation of numbers (fixed and floating point), Problem Solving : Algorithm, Flow Charts.

**Types, Operators and Expressions :** Variable Names, Data Types and Sizes, Constants, Declaration, Type Conversions, Operators, Precedence and Order of Evaluation.

**Control Flow and Behaviour Flow Charts :** Statements and Blocks, If Else Switch.

**Loops :** While, For, Do-While, Break, Continue, Goto and Labels.

## UNIT-II

**Functions :** Basic of Functions, Parameter Passing techniques, Functions Returning Non-integers.

Storage Classes, External Variables, Scope Rules, Header Files, Static and Auto Variables, Register Variable, Block Structure, Initialization. Recursion, The C Preprocessor : # include, # define, conditional compilation.

**Arrays :** One Two and Multi-dimensional arrays, Linear and Binary Search, Selection and Bubble Sort.

**Pointers :** Pointers and Addresses, Pointers and Function Arguments, Pointers and Arrays. Address Arithmetic, Command line arguments.

## UNIT-III

**Structures and Unions :** Basics, Structure and functions, arrays of structures pointers to structures, Self referential structure, Union.

**Files :** Basics and File Handling functions : Copy file and display file.

## UNIT-IV

**C++ :** Introduction, simple program, standard library, header files, inline functions, references and reference parameters, default arguments, empty parameter lists, unary, scope resolution operator, function overloading, function templates.

**Classes and data abstraction :** Class scope, accessing class members, interfere, constructions, destructions, const objects and member functions, this pointer, new and delete operators, static class members.

**C++ Operator overloading :** Fundamentals, restrictions, overloading unary / binary operators, overloading ++ and ---.

## UNIT-V

**C++ Inheritance :** Base and derived classes, casting base class, pointers to derived class pointers, using member functions overriding, public, protected and private inheritance, constructors and destructors in derived classes.

**C++ Virtual Functions :** Abstract base class, polymorphism, dynamic binding, virtual destructors.

**C++ Stream Input/Output :** Streams, stream output, stream input.

**C++ Templates :** Introduction, class templates, templates and inheritance, templates and static members.

**C++ Exception Handling :** Try, throw, catch.

**Suggested Reading :**

1. Rajaraman V. *Computer Programming in C*, Prentice Hall of India, 2008.
2. Walter Savitch, *Programming in C/C++*, Fourth edition, Pearson Educational Publishing, 2008.
3. Harry H. Cheng, *C/C++ for Engineers and Scientists*, TMH 2010.
4. Pradip Dey, Manas Ghosh, *Programming in C*, Oxford, 2007.
5. DM Capper, *Introducing C++ for Scientists*, Engineers and Mathematicians, Springer, 2001.
6. Bjarne Stroustrup, *The C++ Programming Language*, Pearson, Third edition, 2000.
7. K.R. Venugopal, Sudeep R. Prasad, *Mastering in C*, TMH, 1997.
8. K.R. Venugopal, Raj Kumar, T. Ravi Shanker, *Mastering in C++*, TMH, 1997.

CE 101

**ENGINEERING MECHANICS**

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

**UNIT - I**

**System of forces :** Concepts of forces, components of forces in a plane and in space various systems of forces and their resultants, moment of force and its applications and couples.

**Equilibrium of force system :** Free body diagrams, equations of equilibrium of plane force system and spatial force systems.

**UNIT-II**

**Centroid and Centre of gravity :** Significance of centroids, and moment of area, theorems of Pappus, centroids of line elements, plane areas, composite areas and volumes, centre of gravity of bodies.

**Friction :** Types of friction, limiting friction, laws of friction, static and dynamic friction, belt friction, Application of friction to a single body and connecting systems, wedge.

**UNIT-III**

**Area moment of inertia :** Definition, polar moment of inertia, transfer theorem, moment of inertia of composite areas, product of inertia, transfer formula for product of inertia. Mass moment of inertia : Moment of inertia of masses, transfer formula and moment of inertia of composite bodies.

**UNIT-IV**

**Kinematics :** Rectilinear motion, curvilinear motion, velocity and acceleration types of rigid bodies, motion and analysis in a plane.

**Kinetics :** Analysis as a particle and analysis as a rigid body in translation central force Motion, equations of planar motion, fixed axis rotations.

**UNIT-V**

**Work energy method :** Equation for translation, work energy principles applied to a particle motion, connection systems fixed axis rotation, and plane motion.

**Impulse and momentum :** Introduction, linear impulse-momentum, force of jet on a vane, principle of conservation of linear momentum, elastic impact and types of impacts, loss of kinetic energy, coefficient of restitution.

**Suggested Reading :**

1. F.L. Singer, Engineering Mechanics, Harper Collins Publishers, India, 1904.

**Text Books for Reference :**

1. F.P. Beer & E.R. Johnston, Jr. *Vector Mechanics for Engineers*, TMH, 2004.
2. S. Rajasekaran, et al, *Engineering Mechanics*, Vikas Publications, 2002.
3. S.B. Junarkar & H.S. Shah, *Applied Mechanics*, Charotar Publications, 2001.
4. A Nelson, *Engineering Mechanics*, Tata Mc Graw Hill Publications, 2009.
5. Basudeb Bhattacharya, *Engineering Mechanics*, Oxford Press, 2008.
6. Irving H. Shames & G. Krishna Mohana Rao, *Engineering Mechanics*, Pearson Education, 2006.
7. M.C. Goyal & G.S. Raghuvanshi, *Engineering Mechanics*, PHI Learning Private Limited, 2009.
8. MV. Seshagiri Rao & D. Rma Durgaiah, *Engineering Mechanics*, Universities Press, 2005.
9. R.S. Khurmi, *A Text Book of Engineering Mechanics*, S. Chand & Company Ltd., 2010.
10. R.C. Hibbeler & Ashok Gupta, *Engineering Mechanics*, Pearson Education, 2010.

CE 102

**ENGINEERING GRAPHICS**

Instruction	6 Periods per week
Duration of University Examination	3 Hours
University Examination	100 Marks
Sessional	50 Marks

**UNIT-I**

**Instruments and their use :** Lettering and various types of lines, scales, reduced and enlarged scales, representative fraction, types of scales plane, diagonal and vertical.

**Geometrical construction :** Construction of regular polygons inscribed in a circle given the side of the polygon.

**Curves in engineering practice :** Construction of engineering curves such as ellipse parabola, hyperbola, cycloid, epicycloids, hypocycloid and involute.

**UNIT-II**

**Projections of points and straight lines :** Points placed in different quadrants projections-of-straight lines, parallel to one or both the reference planes and contained by one or both the reference planes, perpendicular to one and inclined to the other and inclines to both the reference planes and traces.

**Projections of planes :** Perpendicular planes, traces of planes, Oblique plane and auxiliary planes.

**UNIT-III**

**Sections of solids :** Polyhedra, solids of revolution, projections of solids with axis inclined to one or both the reference planes.

**UNIT-IV**

**Sections of solids :** True shapes of section, sections of prisms, pyramids, cylinder and cones.

**Development of surface :** Development of surface of various solids such as prism pyramids, cylinders and cone in simple position.

**UNIT-IV**

**Isometric projections :** Isometric scale, Isometric projections of prisms, pyramids, cones, shapes and combinations of two or three solids.

**Intersection of Surfaces :** Intersection of cylinder to cylinder and cylinder to cone.

**Suggested Reading :**

1. N.D. Bhatt, *Elementary Engineering Drawing*, Charotar Publications, 2004.

**Text Books for Reference:**

1. K.L. Narayana & K.P. Kanniah, *Text Book on Engineering Drawing*, Scitech Publications, 2002.
2. P.J. Shah, *Engineering Graphics*, S. Chand & Company Ltd., 2010.
3. Dhananjay A Jolhe, *Engineering Drawing*, Tata McGraw Hill Publishing Company Ltd., 2008.
4. K.C. John, *Engineering Graphics for Degree*, PHI Learning Private Limited, 2009.
5. R.K. Dhawan, *Engineering Drawing*, S. Chand & Company Ltd., 2009.
6. M.B. Shah and B.C. Rana, *Engineering Drawing*, S. Chand & Company Ltd., 2009.
7. Basant Agarwal & C.M. Agarwal, *Engineering Drawing*, Tata McGraw Hill Education Pvt. Ltd., 2008.
8. B.V.R. Gupta & Raja Roy, *Engineering Drawing*, I.K. International Publishing House Pvt. Ltd., 2009.

PH 132

**PHYSICS LAB**

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1. P-N Junction Diode Characteristics.
2. Determination of Dielectric constant of a material
3. B-H Curve
4. Determination of Planck's constant using photocell Photo Cell.
5. CRO - Measurement of frequency, phase and amplitude.
6. Characteristics of a Solar Cell
7. Newton's Rings
8. Diffraction due to single slit
9. Diffraction due to double slit
10. Diffraction Grating (normal incidence)
11. Determination of wavelength of Semiconductor Laser
12. Determination of specific rotator power of an optically active substance - Polarimeter.
13. Optical Fiber - NA, acceptance angle and power loss
14. Holography recording and reconstruction
15. Intensity measurement using He-Ne laser
16. Hall effect
17. Thermoelectric power
18. Verification of Malus law
19. Double refraction
20. Study of Thermistor characteristics.
21. Determination of the energy gap of a semiconductor.

**Demonstration Experiments :**

- A. Preparation of single crystals - slow evaporation method
- B. Preparation of nano materials - sol-gel method
- C. Preparation of glasses
- D. Observation of microstructures using microscope
- E. Four-Probe Resistivity apparatus.

CH 132

**CHEMISTRY LAB**

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

**VOLUMETRIC ANALYSIS**

1. Introduction of Volumetric Analysis.
2. Techniques of Weighing and usage of Simple analysis balance.

**PERMANGANOMETRY**

3. Preparation of standard solution of FAS and Standardization of  $\text{KMnO}_4$  Solution.
4. Preparation of Standard solution of Mohr Salt, Standardization of  $\text{KMnO}_4$  solution & Estimation of ferrous iron in the give solution.
5. Ore Analysis - Determination of Manganese in pyrolussite.

**DICHROMETRY**

6. Preparation of Standard solution of Potassium Dichromate, Standardization of Molar salt solution & Estimation of Dichromate chromium in the given solution.

**IODOMETRY**

7. Preparation of standard solution of potassium dichromate and standardization of Sodium thiosulphate solution.
8. Estimation of copper in the Brass solution by using standard Hypo solution.

**ACIDIMETRY**

9. Preparation of standard sodium carbonate solution, Standardization of hydrochloric acids & Estimation of Carbonate, Bicarbonate in the given mixture.

**COMPLEXOMETRY**

10. Preparation of standard Magnesium Sulphate solution, standardization of EDTA solution and estimation of temporary and permanent hardness in the given sample of water.

## ORGANIC POLYMERS

11. Preparation of Urea - Formaldehyde and Thiokol rubber.

## INSTRUMENTAL CHEMICAL ANALYSIS

12. Introduction to instrumental chemical analysis and use of electrical and electronic balance up to 4th decimal place.

## CONDUCTROMETRY

13. Acid-base titration
- Strong acid Vs Strong base
  - Weak acid Vs Strong base titration
  - Mixture of acids Vs Strong base titration

## POTENTIOMETRY

14. Acid base titration
- Strong acid Vs strong base using quinhydrone electrode.
  - Weak acid Vs strong base titration using quinhydrone electrode.
15. Estimation of Ferrous iron by Redox titration

## pH METRY

16. Acid base titration
- Strong acid Vs Strong base
  - Weak acid Vs Strong base

## COLOROMETRY

17. Verification of Beers law : using potassium permanganate and estimation of  $\text{KMnO}_4$  (Mn) in the given solution.
18. Determination of Ferrous iron in cement.

## KINETICS

19. First order reaction - hydrolysis of methyl acetate.

## SPECTROPHOTOMETER

20. Recording of  $\text{Cu}^{+2}$  spectrum, absorptivity (Demo only) determination of  $\lambda_{\text{max}}$  and molar.

### Suggested Reading :

- B.D. Khasla, A Ojulati, V.C. Garg., *Senior Practical Physical Chemistry*, R. Chand and Company, New Delhi, 11th edition.
- S.K. Bhasin and Sudha Rani Dhanpat, *Laboratory Manual on Engineering on Engineering Chemistry*, Rai Publishing Company.

## ME 131

## WORKSHOP PRACTICE

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

Branch of Engg.	Trades for Practice	Trades for Demonstration
Mechanical Production Civil EEE	Fitting Carpentary House Wiring Welding Plumbing	Sheet Metal Work Smithy PC Assembly
CSE ECE IT IT	Fitting Carpentary House Wiring Sheet Metal Work Plumbing	Welding Smithy PC Assembly

Grades for exercises in the trades for practice shall be given to the student. Emphasis must be given for developing necessary skills.

## CS 131

## PROGRAMMING LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1. Familiarization with an editor  
*Program to be written and tested for the following problems 'c' language.*
2. Sin x and Cos x values using series expansion.
3. Frequency of occurrence of characteristics and special characteristics like n, t, white spaces.
4. Bubble sort with an array.
5. Linear and Binary Searches.
6. Matrix addition and multiplication using pointers.
7. Generation of address labels using structures.
8. Sequential file operations.
9. Functions of string manipulations without using library functions.

*The following problems should be programmed using C++ programming language.*

1. Finding maximum, minimum and sum of given set of numbers.
2. Implementation of a matrix class.
3. Classes for Bank Account, Student Information, Library catalog.
4. Creation of complex class with operator overloading.
5. Creation of inheritance hierarchy for graphic shapes.
6. Template functions for min ( ) and max ( ) for finding minimum and maximum in a list of numbers.
7. Programs for finding the number of characters, words and sentences in the given test input.

## EG 131

## ENGLISH LANGUAGE LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

**Note :** While teaching the following items, emphasis may be laid on intensive practice in the language lab. Lecturing may be avoided as far as possible.

1. Introduction to English Phonetics : Introduction to auditory, acoustic and articulatory phonetics; Organs of speech : the respiratory, articulatory and phanatory systems.
2. Sound System of English : Phonetic sound and phonemic sounds, introduction to International Phonetic Alphabet, classification and description of English phonemic sounds; minimal pairs; The syllable : types of syllables; Consonant clusters.
3. Aspects of connected speech : strong forms, weak forms, contracted forms, elision.
4. Word Stress : Primary stress, secondary stress, functional stress, rules of word stress.
5. Rhythm and Intonation : Introduction to rhythm and intonation ; Major patterns of intonation in English with their semantic implications.
6. Presentation Skills : Making effective presentations, expressions which can be used in presentations, use of non-verbal communication, coping with stage fright, handling question and answer session; Use of audio-visual aids, Power Point Presentations.
7. Interview Skills : Planning and Preparing for interviews, facing interviews confidently, use of suitable expressions during interviews.
8. Group Discussions : Objectives of a GD; Types of GDs; Initiating, continuing and concluding a GD.
9. Debate : Differences between a debate and a group discussions, essentials of a debate, conducting a debate.

10. Public Speaking : Advantages of public speaking, essentials of an effective speech, rehearsal techniques, planning and delivering a speech.
11. Role play : Use of dialogues in a variety of situations and settings.
12. Effective use of a dictionary and thesaurus : Advantages of using a dictionary and thesaurus.

**Suggested Reading :**

1. E. Suresh Kumar et al, *English for Success (with CD)*, Cambridge University Press India Pvt. Ltd. 2010.
2. T. Balasubramanian, *A Textbook of English Phonetics for Indian Students*, Macmillian, 2008.
3. Edgar Thorpe, *Winnings at Interviews*, Pearson Education, 2006.
4. Hari Mohan Prasad, *How to prepare for Group Discussions and Interviews*, Tata McGraw Hill, 2006.
5. J. Sethi et al, *A Practical Course in English Pronunciation (with CD)*, Prentice Hall India, 2005.