

Teaching Scheme

| B Sc (Honours) AM SEMESTER –I | | | TEACHING & EXAMINATION SCHEME | | | | | | | | | |
|-------------------------------|--------|---------------------------|-------------------------------|-----------|-----------|-----------|-----------|-----------------------|------------|------------|-----------|------------|
| SR NO | CODE | SUBJECTS | TEACHING SCHEME | | | CREDITS | HOURS | EXAMINATION SCHEME | | | | TOT AL |
| | | | L | T | P | | | THEORY | | PRACT | | |
| | | | | | | | | CIE | ESE | CIE | ESE | |
| 1 | AM0131 | Aviation Legislation | 5 | 1 | 0 | 6 | 6 | 60 | 40 | 0 | 0 | 100 |
| 2 | AM0132 | Aerodynamics | 4 | 0 | 4 | 6 | 8 | 60 | 40 | 60 | 40 | 200 |
| 3 | AM0133 | Electrical Fundamentals 1 | 4 | 0 | 4 | 6 | 8 | 60 | 40 | 60 | 40 | 200 |
| 4 | AM0134 | English communication | 4 | 0 | 0 | 4 | 4 | 60 | 40 | 00 | 00 | 100 |
| TOTAL | | | 17 | 01 | 08 | 22 | 26 | 240 | 160 | 120 | 80 | 600 |

| Subject: Aviation Legislation | | | | | | | | |
|--------------------------------------|-----------------|------------------|----------------|--------------------------------------|---|--|---|--------------|
| Program: B Sc (Honours) AM | | | | Subject Code:AM0131 | | | Semester: I | |
| Teaching Scheme | | | | Examination Evaluation Scheme | | | | |
| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)-Theory | Continuous Internal Evaluation (CIE)-Practical | Total |
| 5 | 1 | 0 | 6 | 16/40 | 0 | 24/60 | 0 | 100 |

Course outcomes:

CO 1: Define the Aircraft Act and rules made under role of DGCA. [BT-1]

CO 2: Explain the relationship between CAR 21, CAR 145, CAR 147, CAR M and CAR 66. [BT-2]

CO 3: Discuss about CAR 66 – Certifying Staff – Maintenance. [BT-2]

CO 4: Discuss in detailed understanding of CAR 145 -Approved Maintenance Organization. [BT-2]

CO 5: Explain the Safety Management System. [BT-2]

CO 6: Discuss CAR 21 Design/ Production Organization Approval, Aircraft modification and repair approval and certification Permit to fly requirements.[BT-2]

Course Content:

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|---------------|--|---------|
| Unit 1 | Regulatory Framework Role of International Civil Aviation Organization; Introduction to Chicago Convention, 1944; Introduction to ICAO, Convention, Standards and Recommended Practices; The Aircraft Act, 1934; The Aircraft Rules, 1937 - Part I, II, III, IV, VI, VII, IX, XI A, XI B, XI C, XIII, XIV Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147; Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release); CAR - Sections 1 and 2 | 16 Hrs. |
| Unit 2 | CAR-M Detail understanding of CAR M provisions related to Continuing Airworthiness; Detailed understanding of CAR-M. CAR-145 — Approved Maintenance Organisations Detailed understanding of CAR-145 and CAR M Subpart F CAR-66 Certifying Staff - Maintenance Detailed understanding of CAR-66. AR-147 Approved Maintenance Training Organization Detailed understanding of CAR-147. Aircraft Operations Commercial Air Transport/Commercial Operations; Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings); | 16 Hrs. |
| Unit 3 | Aircraft Certification (a) General - Certification rules: such as FAA & EACS 23/25/27/29; Type Certification Supplemental Type Certification; Type Approval; CAR-21 Sub-Part F, G, H, I, M, P & Q Aircraft Modifications and repairs approval and certification; permit to fly requirements (b) Documents - Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station Licence and Approval. | 16 Hrs. |
| Unit 4 | Applicable National and International Requirements Introduction to ICAO, FAR, EASA Regulations - Aircraft Maintenance and certification (a) Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List; Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; | 12 Hrs. |

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| | <p>(b) Continuing airworthiness; Test flights; ETOPS /EDTO, maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements; RNP, MNPS Operations</p> <p>All Weather Operations; Category 2/3 operations and minimum equipment, maintenance, training and certification requirements.</p> <p>Safety Management System</p> <p>State Safety Programme; Basic Safety Concepts; Hazards & Safety Risks; SMS</p> <p>Operation; SMS Safety performance; Safety Assurance.</p> <p>Fuel Tank Safety</p> <p>Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47; Concept of CDCCL, Airworthiness Limitations Items (ALI).</p> | |
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Text/Reference Books:

Reference Books:

The Aircraft Act, 1934

The Aircraft Rules, 1937 VOL 1

The Aircraft Rules, 1937 VOL 3

- i. Aeronautical Information Circular
- ii. CAR – section – 1,2 & 8 SMS
- iii. CAR- 21, M,145,66 & 147
- iv. Special Federal Aviation Regulations (SFARs)-14 CFR, SFAR 88 & JAA TGL 47 Airworthiness Procedure Manual

Tutorial : Aviation Legislation

- 1 AME licencing procedure in various categories
- 2 Approval of a typical continuing airworthiness management organisation
- 3 Approval of a typical maintenance organisation
- 4 Registration of an Aircraft
- 5 Obtaining C of A for a new aircraft
- 6 Renewal of ARC
- 7 Approval of Aircraft Maintenance programme
- 8 Approval of MEL
- 9 Aircraft defect recording, reporting, rectification and certification

| Subject: Aerodynamics | | | | | | | | |
|----------------------------|----------|-----------|---------|-------------------------------|----------------------------------|--|---|-------|
| Program: B Sc (Honours) AM | | | | Subject Code:AM0132 | | | Semester: I | |
| Teaching Scheme | | | | Examination Evaluation Scheme | | | | |
| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 4 | 0 | 4 | 6 | 16/40 | 16/40 | 24/60 | 24/60 | 200 |

Course outcomes:

CO 1: Differentiate the properties of different layers of the atmosphere. [BT-2]

CO 2: List out the parts name of an aircraft. [BT-1]

CO 3: Analyze the behavior of different types of airfoil in the atmosphere. [BT-4]

CO 4: Calculate the four forces and moments which act on an aircraft. [BT-3]

CO 5: Measure the value of 'g' force theoretically while maneuvering. [BT-5]

CO 6: Create new ideas to enhance aircraft's overall performance. [BT-6]

Course Content:

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| Unit 1 | <p>Physics of the Atmosphere International Standard Atmosphere (ISA), application to aerodynamics.</p> <p>Aerodynamics Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, aerodynamic centre, centre of pressure, stagnation point, profile (parasite) drag, induced drag, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.</p> | 15 Hrs. |
| Unit 2 | <p>Theory of Flight Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.</p> <p>Flight Stability and Dynamics Longitudinal, lateral and directional stability (active and passive</p> | 15 Hrs. |

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| Unit 3 | Theory of Flight - Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panel. | 15 Hrs. |
| Unit 4 | Basic Instrument System: Classification; Atmosphere; Terminology; Pressure measuring devices and systems; Pitot static systems; Altimeters; Vertical speed indicators; Airspeed indicators; Machometer; Altitude reporting/alerting systems; Air data computers; rate of climb / vertical speed indicator, cabin pressure indicator, pneumatic systems instruments; High Speed Flight: Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility effect, buffet, shock wave, aerodynamic heating, area rule. Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number. Rotary Wing Aerodynamics Elementary rotary wing and aerodynamic Terminology; Basic operation and effect of cyclic, collective and anti-torque controls. | 15 Hrs. |

Reference Books:

Aerodynamics - By Clancey

Mechanics of Flight By - A.C.Kermode

Force measurement on symmetric airfoil.

Force measurement on cambered airfoil.

Aircraft Instruments-by E.H.J.Pallett

Aircraft Instruments-by C.A.Williams

List of Practical (Aerodynamics)

- 1** Flow around various objects in a 'Water Channel' - Square, Cylinder, Aerofoil
-
Understanding laminar flow, turbulent flow, stagnation point, flow separation, boundary layer,
- 2** Fabricate Aerofoil Model - Understanding associated terms
- 3** Water Channel - Effect of vortex generator on boundary layer control
- 4** Effect of angle of attack and airflow velocity on lift and Stalling
- 5** Study of flow over streamlined bodies with different angle of attack by flow visualization technique
- 6** Identification of flight control surfaces and their effect on flight control - Aircraft Model
- 7** Identifying High lift devices and practical understanding of their effect on lift with respect to aircraft speed (Air flow)
- 8** Practical understanding of lift spoiling devices.
- 9** Removal / installation of Pitot Static Instruments.
- 10** Calibration of a Pitot Static System using a Pitot Static Leak tester.
- 11** Fabrication of model - high speed flight
- 12** Practical study of various factors affecting lift and drag on an aerofoil.
- 13** Factors affecting flow of fluid over an aerofoil surface and demonstrate the venturi effect
- 14** Identify various type of flap surfaces and their effect on high lift and high drag characteristic
- 15** Identification of various parts of Rotary wing.

Subject: Electrical Fundamentals

| Program: B Sc (Honours) AM | | | | Subject Code:AM0133 | | | Semester : I | |
|-----------------------------------|-----------------|------------------|----------------|--------------------------------------|---|---|--|--------------|
| Teaching Scheme | | | | Examination Evaluation Scheme | | | | |
| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 4 | 0 | 4 | 6 | 16/40 | 16/40 | 24/60 | 24/60 | 200 |

Course Objectives

1. To describe the various basic concepts of electrical parameters.
2. To describe the basics of electrical equipment.
3. To discuss the understanding of various types of electrical motors.
4. To discuss the various electrical transformers etc.

Course Outcomes:

- CO 1: State the different types of electrical laws. [BT-1]
 CO2: Explain different types of electrical components. [BT-2]
 CO 3: Calculate the different types of electrical parameters. [BT-3]
 CO 4: Describe the concepts and ideas of AC fundamentals. [BT-2]
 CO 5: Explain the working principle & construction of Electrical machines. [BT-2]
 CO 6: Design & development of different types of Filters. [BT-6]

Course Content:

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| Unit 1 | <p>Electron Theory Structure and distribution of electrical charges within: atoms, molecules, ions, compounds Molecular structure of conductors, semiconductors and insulators.</p> <p>Static Electricity and Conduction Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.</p> <p>Electrical Terminology The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.</p> <p>DC Circuits Ohms Law, Kirchhoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.</p> | 10 Hrs. |
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| | <p>Resistance/Resistor</p> <p>Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge.</p> <p>Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;</p> | |
| <p>Unit 2</p> | <p>Capacitance/Capacitor</p> <p>Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor color coding;</p> <p>Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.</p> <p>Magnetism</p> <p>Theory of magnetism; Properties of a magnet Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.</p> <p>Magneto motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.</p> <p>Inductance/Inductor:</p> <p>Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field;</p> <p>Induction principles; Effects of the following on the magnitude of</p> | <p>10 Hrs.</p> |

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| | <p>an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self-induction; Saturation point; Principle uses of inductors;</p> | |
| Unit 3 | <p>AC Theory</p> <p>Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power triangular/square waves : 3 phase principles.</p> <p>Resistive (R), Capacitive (C) and Inductive (L) Circuits Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.</p> <p>Transformers Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.</p> <p>Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.</p> | 20 Hrs. |
| Unit 4 | <p>Generation of Electricity Elementary knowledge on generation of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.</p> <p>DC Sources of Electricity Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; internal resistance and its effect on a battery; Construction, materials</p> | 20 Hrs. |

and

operation of thermocouples; Operation of photo-cells.

DC Motor/Generator Theory

Basic motor and generator theory; Construction and purpose of components in DC

generator; Operation of, and factors affecting output and direction of current flow

in DC generators; Operation of, and factors affecting output power, torque, speed

and direction of rotation of DC motors; Series wound, shunt wound and compound

motors; Starter Generator construction.

AC Generators :

Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators;

Single

phase, two phase and three phase alternators; Three phase star and delta

connections advantages and uses;

Permanent Magnet Generators.

AC Motors :

Construction, principles of operation and characteristics of: AC synchronous and

induction motors both single and polyphase; Methods of speed control and direction of rotation;

Methods of producing a rotating field: capacitor, inductor, shaded or split pole.

Power:

Power, work and energy (kinetic and potential); Dissipation of power by a resistor;

Power formula; Calculations involving power, work and energy.

Aircraft Electrical Cables and Connectors

a). Cable types, construction and characteristics; High tension and co-axial cables;

Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage

rating, coupling, identification codes. .

B). Electrical Wiring Interconnection System (EWIS) Continuity, insulation and bonding techniques and

Testing; Use of crimp tools: hand and hydraulic operated; testing of crimp joints;

Connector pin removal and insertion; Co-axial cables: testing and installation Precautions; Identification of wire types, their inspection criteria and damage

tolerance

Wiring protection techniques: Cable looming and loom support, cable clamps, and protective

Sleeving techniques including heat shrink wrapping, shielding. EWIS installations,

Inspection, repair, maintenance and cleanliness standards

Electromagnetic Environment

Influence of the following phenomena on maintenance practices for

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| <p>electronic system: EMC-Electromagnetic Compatibility; EMI-Electromagnetic Interference; HIRF-High Intensity Radiated Field; Lightning/lightning protection Electro sensitive devices Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices</p> | |
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Reference Books:

Reference Books:

Electrical Technology- by B.L.Theraja

Aircraft Electrical System- by E.H.J.Pallett

Aircraft Electricity and electronics-by Bent McKinley and also by Eismin/Bent McKinley

List of Practical : Electrical fundamentals

- 1 Simple experiments with static electricity and the coulomb's law
- 2 Application of Electromotive forces and Potential difference Ballistic
Galvanometer: (i) Measurement of charge and current sensitivity
Measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d)
- 3 checking
electrical fuses and connection
- 4 Use of a range of test meters to measure volts, amps and resistance.
Resistor colour codes - Calculation of resistance value using colour
- 5 codes
- 6 Potentiometer , rheostat and wheat stone bridges and determine unknown
resistance
- 7 Use a Multimeter for measuring Resistances, checking electrical fuses Identify
various types of resistance
- 8 Identify various types of capacitances
Measurement of magnetic field strength. Magnetic field density and
- 9 permeability
using flux meter.
- 10 Production of electricity by inductance methods
- 11 Single phase and three phase power supply distribution using star and delta
connection
Construct series LCR circuit and determine its (a) Resonant Frequency, (b)
- 12 Quality

- Factor,
Construct parallel LCR circuit and determine its (a) Anti-resonant frequency and
13 (b) Quality factor Q
- 14** Use of transformer in power distribution and measurements.
Make filters circuit to study function of low pass, high pass, band pass and
15 band
stop.
- 16** Generation of electricity by light , heat, chemical action, magnetism, and motion
- 17** Construct power sources using primary and secondary cells
- 18** Construct a model to study usage of thermo-cell and photo-cell
- 19** Construct a model to generate DC power using different method of coil
arrangements (Series, shunt) to understand their Usage.
- 20** Construct a model of DC motor using different method of coil arrangements
(Series, shunt) to understand their Usage.
- 21** Construct a model to generate single/Poly-phase AC power to understand their
Usage.
- 22** Construct a model of AC motor using single/ Poly-phase I arrangements to
understand their Usage.
- 23** Measure amount of power dissipated by various resistors; calculation of
power
- 24** Using at least two crimping systems, select appropriate cable crimping tools and
crimp cables to prepare cable ends or plug / socket terminals.
- 25** Check an aircraft electrical circuit for continuity in conjunction with an electrical
wiring diagram.
- 26** Identify cables and cables values by reference to the maintenance manuals.
Identify a range of electrical component symbols.
- 27** Inspection of electrical cable looms / bundles and cable trunking.
Select and use appropriate cable stripping tools and solder cables to single
28 and
multipin connectors / tag boards
- 29** Prepare, and install a simple loom, using at least two binding methods
- 30** Identification of various fasteners and locking devices used in aircraft.

| Subject: English Communication | | | | | | | | |
|---------------------------------------|----------|-----------|---------|-------------------------------|----------------------------------|--|---|-------|
| Program: B Sc (Honours) AM | | | | Subject Code: AM0134 | | | Semester: I | |
| Teaching Scheme | | | | Examination Evaluation Scheme | | | | |
| Lecture | Tutorial | Practical | Credits | University Theory Examination | University Practical Examination | Continuous Internal Evaluation (CIE)- Theory | Continuous Internal Evaluation (CIE)- Practical | Total |
| 4 | 0 | 0 | 4 | 16/40 | 00 | 24/60 | 00 | 100 |

Course outcomes:

- CO 1: Describe various types and modes of communication. [BT-2]
 CO 2: Explain language of communication. [BT-2]
 CO 3: Demonstrate various methods of speaking skills. [BT-3]
 CO 4: Determine various methods of reading and understanding. [BT-3]
 CO 5: Analysis and Interpretation, Translation (from Indian language to English and vice-versa).[BT-4]
 CO 6: Compose various letters by using writing skills methods.[BT-6]

Course Content:

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|---------------|--|---------|
| Unit 1 | Introduction Theory of Communication, Types and modes of Communication | 10 Hrs. |
| Unit 2 | Language of Communication Verbal and Non-verbal (Spoken and Written), Personal, Social and Business Barriers and Strategies Intra-personal, Inter personal and Group communication | 15 Hrs. |
| Unit 3 | Speaking Skills Monologue, Dialogue, Group Discussion, Effective Communication/ Mis-Communication, Interview, Public Speech | 15 Hrs. |
| Unit 4 | Reading and Understanding Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation (from Indian language to English and vice-versa), Literary/Knowledge Texts. Writing Skills Documenting, Report Writing, Making notes, Letter writing | 20 Hrs. |

Text & Reference Books :

- Fluency in English - Part II, Oxford University Press, 2006
- V.R. Narayanaswami, Strengthen Your Writing, 3rd Edition, Orient Longman, 2005.
- Andrea J. Rutherford, Basic Communication Skills for Technology, 1stEdition, Pearson Business English, Pearson, 2008
- Language, Literature and Creativity, Orient Blackswan, 2013
Education Asia (Singapore) Pvt. Ltd., Bangalore, 2001.
- Language through Literature (forthcoming) ed. Dr. Gauri Mishra,Dr Ranjana Kaul, Dr Brati Biswas
- Nell Ann Pickett, Ann A. Laster, Katherine E. Staples, Technical English (Writing, Reading and Speaking), 8th Edition, Pearson Education, USA, Addison Wesley Longman Inc., 2001