SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

for

BACHELOR OF TECHNOLOGY
(Instrumentation & Control Engineering)

GURU GOBIND SINGH
INDRAPRASTHA UNIVERSITY
KASHMERE GATE, DELHI

BACHELOR OF TECHNOLOGY
(B.TECH.) DEGREE COURSE (Common to all branches)

FIRST SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETMA 101	Applied Mathematics – I	3	1	4
ETPH 103	Applied Physics – I	2	1	3
ETCH 105	Applied Chemistry – I	2	1	3
ETME 107	Manufacturing Process	2	0	2
ETCS 109	Introduction to Computers and Auto CAD	2	1	3
ETEL 111	Communication Skills – I	2	1	3
ETEL 113*	Impact of Science & Technology on Society	1	0	1
PRACTICAL/VIVA VOCE				
ETPH 151	Applied Physics Lab. – I	-	2	1
ETCH 153	Applied Chemistry Lab. – I	-	2	1
ETCS 155	Introduction to Auto CAD Office Automation and Web Design	-	3	2
ETME 157	Workshop Practice	-	3	2
ETME 159	Engineering Graphics Lab.	-	2	1
	TOTAL	**14**	**17**	**26**

ETEL-113* is NUES

BACHELOR OF TECHNOLOGY
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SECOND SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETMA 102	Applied Mathematics – II	3	1	4
ETPH 104	Applied Physics – II	2	1	3
ETCH 106	Applied Chemistry – II	2	1	3
ETCS 108	Introduction to Programming	2	1	3
ETME 110	Engineering Mechanics	2	1	3
ETEC 112	Electrical Science	2	1	3
ETEL 114	Communication Skills – II	2	1	3
PRACTICAL/VIVA VOCE				
ETPH 152	Applied Physics Lab. – II	-	2	1
ETCH 154	Applied Chemistry Lab. – II	-	2	1
ETCS 156	C Programming Lab.	-	2	1
ETME 158	Engineering Mechanics Lab.	-	3	2
ETEC 160	Electrical Science Lab.	-	2	1
	TOTAL	**15**	**18**	**28**

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THIRD SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETMA 201	Applied Mathematics-III	3	1	4
ETIC 203	Analog Electronics	3	1	4
ETEC 205	Circuits & Systems	3	1	4
ETIC 207	Electrical Machines	3	1	4
ETIC 209	Instrumentation	3	1	4
ETCS 211	Data Structures	3	1	4
PRACTICAL/VIVA VOCE				
ETIC 251	*Analog Electronics Lab.	0	2	1
ETIC 253	*Circuits & Systems Lab.	0	2	1
ETIC 255	Electrical Machines Lab.	0	2	1
ETCS 257	Data Structures Lab	0	2	1
	Total	**18**	**14**	**28**

***Some lab experiments must be performed using any circuit simulation software e.g. PSPICE.**

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FOURTH SEMESTER

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETIC 202	Object Oriented Programming using C++	3	1	4
ETIC 204	Measurement Techniques	3	1	4
ETIC 206	Digital Electronics	3	1	4
ETIC 208	Control System – I	3	1	4
ETIC 210	Industrial Instruments	3	1	4
ETIC 212	Fluid Mechanics & Thermodynamics	3	1	4
PRACTICAL/VIVA VOCE				
ETIC 252	Object Oriented Programming using C++ Lab.	0	2	1
ETIC 254	Measurement Techniques Lab	0	2	1
ETIC 256	*Digital Electronics Lab	0	2	1
ETIC 258	Control System – I Lab	0	2	1
ETIC 260	Industrial Instruments Lab	0	2	1
	TOTAL	**18**	**16**	**29**

***Some lab experiments must be performed using any circuit simulation software.**

NOTE: **4-6 weeks training will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester.**

BACHELOR OF TECHNOLOGY
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FIFTH SEMESTER

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETIC 301	Communication System	3	1	4
ETIC 303	Microprocessor System - I	3	1	4
ETIC 305	Operating System	3	1	4
ETIC 307	Pneumatic & Hydraulic Instrumentation	3	1	4
ETIC 309	Control System – II	3	1	4
ETIC 311	Linear Integrated Circuits	3	1	4
PRACTICAL/VIVA VOCE				
ETIC 351	Microprocessor System – I Lab	0	2	1
ETIC 353	Pneumatic & Hydraulic – Lab.	0	2	1
ETIC 355	Control System – II Lab	0	2	1
ETIC 357	Linear Integrated Circuits Lab	0	2	1
ETIC 359	#^Practical Training	-	-	1
	Total	**18**	**14**	**29**

 # NUES

^Practical training was conducted after fourth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.

BACHELOR OF TECHNOLOGY
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SIXTH SEMESTER

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETIC 302	Microprocessor System – II	3	1	4
ETIC 304	Power Electronics	3	1	4
ETIC 306	Process Control	3	1	4
ETIT 308	Digital Signal Processing	3	1	4
ETMS 310	Industrial Economics & Management	3	1	4
ETIC 312	Electrical Drives & Control	3	1	4
PRACTICAL/VIVA VOCE				
ETIC 352	Microprocessor System – II Lab	0	2	1
ETIC 354	Power Electronics Lab	0	2	1
ETIT 356	Digital Signal Processing Lab	0	2	1
ETIC 358	Process Control Lab.	0	2	1
	Total	**18**	**14**	**28**

NOTE: 4-6 weeks training will be held after sixth semester. However, Viva-Voce will be conducted in the seventh semester.

BACHELOR OF TECHNOLOGY
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SEVENTH SEMESTER

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETIC 401	Micro Controller	3	1	4
ETIC 403	Biomedical & Analytical Instrumentation	3	1	4
ELECTIVES (SELECT ANY TWO)				
ETEE 405	Computer Networks	3	1	4
ETIC 407	Project	-	-	4
ETIC 409	Instrumentation Diagnostic	3	1	4
ETIC 411	Computerized Process Control	3	1	4
ETIC 413	Database Management System	3	1	4
ETEE 415	Software Engineering	3	1	4
ETIC 417	Process Modeling & Optimization Techniques	3	1	4
PRACTICAL/VIVA VOCE				
ETIC 451	Micro Controller Lab.	0	2	1
ETIC 453	Biomedical Lab.	0	2	1
ETIC 455	#^Practical Training	0	0	1
ETIC 457	*Minor Project	0	8	4
ETIC 459	#Seminar	0	2	1
	Total	**12**	**18**	**24**

NON UNIVERSITY EXAMINATION SYSTEM

*The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

^Practical training was conducted after sixth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.

BACHELOR OF TECHNOLOGY
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EIGHTH SEMESTER

Code No.	Paper	L	T/P	Credits
THEORY PAPERS				
ETIC 402	Soft Computing	3	1	4
ETIC 404	Robotics	3	1	4
ELECTIVES - SELECT ANY ONE				
ETEC 406	Consumer Electronics	3	1	4
ETIT 408	Embedded System	3	1	4
ETEE 410	Object Oriented Software Engineering	3	1	4
ETEC 412	Digital image processing	3	1	4
ETEE 414	Advanced Computer Networks	3	1	4
PRACTICAL/VIVA VOCE				
ETIC 452	Soft Computing Lab	0	2	1
ETIC 454	Robotics Lab	0	2	1
ETIC 456	Elective Lab.	0	2	1
ETIC 458	*Major Project	0	12	7
	Total	**09**	**21**	**22**

*The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

NOTE:

1. The total number of the credits of the B.Tech. (I & CE) Programme = 214
2. Each student shall be required to appear for examinations in all courses. However, for the award of the degree a student shall be required to earn the minimum of 200 credits.

Paper Code: ETMA-101	**L**	**T**	**C**
Paper: Applied Mathematics – I	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT I

COMPLEX NUMBERS AND INFINITE SERIES: De Moivre's theorem and roots of complex numbers. Euler's theorem, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses. Convergence and Divergence of Infinite series, Comparison test d'Alembert's ratio test. Higher ratio test, Cauchy's root test. Alternating series, Lebnitz test, Absolute and conditioinal convergence. **[No. of Hrs. 10]**

UNIT II

CALCULUS OF ONE VARIABLE: Successive differentiation. Leibnitz theorem (without proof) McLaurin's and Taylor's expansion of functions, errors and approximation.

Asymptotes of Cartesian curves. Curveture of curves in Cartesian, parametric and polar coordinates, Tracing of curves in Cartesian, parametric and polar coordinates (like conics, astroid, hypocycloid, Folium of Descartes, Cycloid, Circle, Cardiode, Lemniscate of Bernoulli, equiangular spiral). Reduction Formulae for evaluating

Finding area under the curves, Length of the curves, volume and surface of solids of revolution.

[No. of Hrs. 15]

UNIT III

LINEAR ALGEBRA – MATERICES: Rank of matrix, Linear transformations, Hermitian and skeew – Hermitian forms, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Diagonalisation of a matrix, Eigen values and eigen vectors. Caley – Hamilton theorem (without proof). **[No. of Hrs. 09]**

UNIT IV

ORDINARY DIFFERENTIAL EQUATIONS: First order differential equations – exact and reducible to exact form. Linear differential equations of higher order with constant coefficients. Solution of simultaneous differential equations. Variation of parameters, Solution of homogeneous differential equations – Canchy and Legendre forms. **[No. of Hrs. 10]**

TEXT BOOKS:

1. Kresyzig, E., "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).
2. Jain, R. K. and Iyengar, S. R. K., "Advanced Engineering Mathematics", Narosa, 2003 (2^{nd} Ed.).

REFERENCE BOOKS:

1. Mitin, V. V.; Polis, M. P. and Romanov, D. A., "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001.
2. Wylie, R., "Advanced Engineering Mathematics", McGraw-Hill, 1995.
3. "Advanced Engineering Mathematics", Dr. A. B. Mathur, V. P. Jaggi (Khanna publications)

Paper Code: ETPH – 103 **L T C**
Paper: APPLIED PHYSICS – I **2 1 3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Interference of Light: Interference due to division of wavefront and division of amplitude, Young's double slit expt., Interference, Principle of Superposition, Theory of Biprism, Interference from parallel thin films, wedge shaped films, Newton rings, Michelson interferometer.

Diffraction: Fresnel Diffraction, Diffraction at a straight edge, Fraunhoffer diffraction due to N slits, Diffraction grating, absent spectra, dispersive power of Grating, resolving power of prism and grating. **[No. of Hrs. 8]**

UNIT - II

Polarization: Introduction, production of plane polarized light by different methods, Brewster and Malus Laws. Double refraction, Quarter & half wave plate, Nicol prism, specific rotation, Laurent's half shade polarimeter.

Optical Instruments : Ramdson & Huygen Eye pieces, Electron microscope.

[No. of Hrs. 8]

UNIT - III

Laser: Introduction, temporal and spatial coherence, principle of Laser, stimulated and spontaneous emission, Einstein's Coefficients, He-Ne Laser, Ruby Laser, Application of Lasers.

Fibre Optics: Introduction, numerical aperture, step index and graded index fibres, attenuation & dispersion mechanism in optical fibers (Qualitative only), application of optical fibres, optical communication (block diagram only) **[No. of Hrs. 8]**

UNIT - IV

Mechanics: Central and non-central forces, Inverse square force, SHM, Damped, undamped and forced Oscillations.

Special theory of Relativity: Frame of reference, Michelson-Morley experiment, basic postulates of special relativity, Lorentz transformations (space – time coordinates & velocity only), mass energy relation. **[No. of Hrs. 8]**

TEXT BOOKS:

1. A. Ghatak, "Optics"
2. N. Subrahmanyam and Brij Lal, "Optics"

REFERENCE BOOKS:

1. Jenkins and White, "Fundamentals of Optics"
2. C. Kittle, "Mechanics", Berkeley Physics Course, Vol.- I.
3. A. Beiser, "Concepts of Modern Physics"

Paper Code: ETCH – 105 **L T C**
Paper: Applied Chemistry – I **2 1 3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Water: Specifications for water, analysis of water – alkalinity, hardness and its determination (EDTA method only). Water for domestic use, Water softening processes – Lime – Soda process, Ion exchange method, boiler feed water, boiler problems-scale, sludge, priming and foaming, caustic embitterment and corrosion, their causes and prevention, removal of silica, removal of dissolved gases, carbonate and phosphate conditioning, colloidal conditioning, calgon treatment, Numerical problems on alkalinity, hardness, Lime-Soda process and Ion exchange method, EDTA method. **[No. of Hrs: 08]**

UNIT - II

Fuels: Classification, combustion and chemical principles involved in it, calorific value: gross and net calorific values and their determination by bomb calorimeter and Boy's gas calorimeter.

Solid Fuels: Proximate and ultimate analysis of coal and their importance, High and low temperature carbonisation, Coke: Its manufacture by Otto Hoffman oven.

Liquid Fuels: Conversion of coal into liquid fuels (Bergius process and Fisher-Tropsch Process) and mechanism, Petroleum: its chemical composition and fractional distillation, cracking of heavy oil residues – thermal and catalytic cracking, knocking and chemical structure, octane number and cetane number and their significance, power alcohol, Analysis of flue gases by Orsat's apparatus, Numerical on calorific value, combustion, proximate and ultimate analysis of coal, flue gas analysis. **[No. of Hrs: 08]**

UNIT - III

Environmental Pollution and Control: Air Pollution: Types of pollutants, source effects, sink and control of primary pollutants – CO, No_x, HC, So_x and particulates, effects of pollutants on man and environment – photochemical smog and acid rain.

Water Pollution: Classification of pollutants, their sources, waste water treatment – domestic and industrial.

Soil Pollution: Composition of soil, classification and effects of soil pollutants and their control.

Solid Waste Pollution: Classification, waste treatment & Disposal methods (Composting, sanitary landfilling, thermal processes, recycling and reuse).

Hazardous Wastes: Classification – radioactive, biomedical and chemical, treatment and disposal – physical, chemical and biological processes. **[No. of Hrs: 08]**

UNIT - IV

Solutions: Ideal and non-ideal solutions, Raoult's Law, Distillation of binary solutions, Henry's Law, Nernst distribution law, Arrhenius theory and special behaviour of strong electrolytes.

Corrosion: Types of corrosion (dry, wet, atmospheric and soil corrosion), theories of corrosion, protective measures against corrosion. **[No. of Hrs: 08]**

TEXT BOOKS:

1. Chemistry in Engineering & Technology (Vol I & II) (Latest ed.), By J.C. Kuriacose & J. Rajaram
2. Environmental Chemistry & Pollution Control (Latest ed.), By S.S. Dara
3. Applied Chemistry (Latest ed.), By H.D. Gesser

Paper Code: ETME 107 **L T C**
Paper: Manufacturing Processes **2 0 2**

INSTRUCTIONS TO PAPER SETTERS:	MAXIMUM MARKS: 75
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Casting Processes:

Principles of metal casting: Pattern materials, types and allowance; Study of moulding, sand moulding, tools, moulding materials, classification of moulds, core, elements of gating system, casting defects, description and operation of cupola: special casting processes e.g. die-casting, permanent mould casting, centrifugal casting, investment casting. **[No. of Hrs. 6]**

UNIT - II

Smithy and Forging:

Basic operation e.g. upsetting, fullering, flattening, drawing, swaging: tools and appliances: drop forging, press forging.

Bench Work and Fitting

Fitting, sawing, chipping, thread cutting (die), tapping; Study of hand tools, Marking and marking tools. **[No. of Hrs. 6]**

UNIT - III

Metal joining:

Welding principles, classification of welding techniques; Oxyacetylene Gas welding, equipment and field of application, Arc-welding, metal arc, Carbon arc, submerged arc and atomic hydrogen welding, Electric resistance welding: spot, seam, butt, and percussion welding; Flux: composition, properties and function; Electrodes, Types of joints and edge preparation, Brazing and soldering. **[No. of Hrs. 6]**

UNIT – IV

Sheet Metal Work:

Common processes, tools and equipments; metals used for sheets, standard specification for sheets, spinning, bending, embossing and coining. **[No. of Hrs. 5]**

TEXT BOOKS:

1. Manufacturing Process by Raghuvanshi.
1. Manufacturing Technology by P.N.Rao (TMH publications)

REFERENCE BOOK:

1. Workshop Technology by Hazra-Chowdhary
2. Production Engineering by R.K.Jain
3. Workshop Technology by Chapman

Paper Code: ETCS 109 | ***L*** | ***T*** | ***C***
Paper: Introduction to Computer Systems | **2** | **1** | **3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Introduction to Computer:

Overview of Computer organization and historical perspective computer applications in various fields of science and management.

Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions.

Binary arithmetic, Floating-point arithmetic, signed and unsigned numbers.

[No. of Hrs. 8]

UNIT - II

Introduction to OS and Office Automation

Concept of computing, Introduction to Operating Systems such as DOS, windows 2000/Xp, UNIX, Client Server Technology, etc. (only brief user level description).

Introduction to World Processing, Spread Sheet & Presentation software e.g. MS-Word, MS-Excel, MS-Power Point. **[No. of Hrs. 8]**

UNIT - III

Introduction to Auto CAD

Coordinate System, 2D drafting: lines, circles, arc, polygon, etc., Editing, 3D, Solid modeling, Rendering, Use of Auto CAD for engineering drawing practices. **[No. of Hrs. 8]**

UNIT - IV

Web Technologies

Introduction to World Wide Web, Search engines, e-mail, news, gopher, Audio & Video Conferencing, Internet Protocols: FTP, telnet, TCP/IP, SMTP, HTTP, Languages used for WEB Technology: HTML, practical examples using DHTML and Static HTML

[No. of Hrs. 8]

TEXT BOOKS:

1. Rajaraman, "Fundamentals of Computers", Prentice Hall of India, 3rd Edition.
2. Mark Middlebrook, "Autocad 2004 for Dummies", Wiley Dreamtech, 2000.
3. Vikas Gupta, "Comdex Computer Course Kit", Dreamtech Press, 2004.

REFERENCE BOOKS:

1. Alexis Leon & Mathews Leon, "Fundamentals of Computer Science & Communication Engineering", Leon Techworld, 1998.
2. Omura, "Mastering Autocad 2000 for Mechanical Eng ineers" BPB Publications, 2nd Edition, 1998.
3. A.S. Tanenbaum, " Computer Networks", Pearson Education India Ltd., 3rd Edition, 2002.

Paper Code: ETEL-111 **L T C**
Paper: Communication Skills – I **2 1 3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Remedial Grammar: Errors of Accidence and syntax with reference to Parts of Speech; Agreement of Subject and Verb; Tense and Concord; Conditional Clauses; Use of connectives in Complex and Compound sentences; Question tags and short responses.

[No. of Hrs: 06]

UNIT - II

Vocabulary and Usage: Word Formations (by adding suffixes and prefixes); Technical Word Formation; Synonyms, Antonyms, Homophones, and Homonyms; One Word Substitution; Misappropriations; Indianisms; Redundant Words; Phrasal Verb Idioms. **[No. of Hrs: 06]**

UNIT - III

Technical Writing:

(A) Scientific Attitude and Impersonal Style; Plain Statements, Definitions; Description and Explanations (of objects, instruments, Processes, Scientific Principles, etc.)

Summarizing and abstracting; Expressing ideas within a restricted word limit; Paragraph Writing (Paragraph division, introduction and the conclusion, Variety in sentences and paragraphs)

Interpretation and use of charts, graphs and tables in technical writing.

Punctuation

(B) Reading at various speeds (slow, fast, very fast); reading different kinds of texts for different purpose (e.g. for relaxation, for information, for discussion at a later stage, etc.); reading between the lines.

Comprehension of Unseen Passages **[No. of Hrs: 10]**

UNIT - IV

Text: The following prose pieces from ***Best Science Writing : Reading and Insights*** edited by Robert Gannon prescribed text (Hyderabad: University Press (India) Limited, 1991).

1. Chapter 2: "After 63 years, Why Are They Still Testing Einstein?" by C.P. Gilmore
2. Chapter 5: "Star Wars : The Leaky Shield" By Carl Sagan
3. Chapter 10: "Chaos : The Ultimate Asymmetry" by Arthur Fisher
4. Chapter 11: "Bill Moss, Tentmaker" by Robert Gannon
5. Chapter 12: "Totality - A Report" by Michael Rogers

[No. of Hrs: 10]

TEXT BOOKS:

1. Maison, Margaret M. Examine Your English, Hyderabad: Orient Longman, 1980
2. Sharma, R.S. Technical Writing. Delhi: Radha Publication, 1999
3. Sudarsanam, R. Understanding Technical English. Delhi: Sterling Publishers Pvt. Ltd., 1992
4. Gannon, Robert, Edt. Best Science Writing: Readings and Insights. Hyderabad: University Press (India) Limited, 1991.

Paper Code: ETEL-113	**L**	**T**	**C**
Paper: Impact of Science & Technology on Society	**1**	**0**	**1**

***Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.

Paper Code: ETPH-151	**L**	**P**	**C**
Paper: APPLIED PHYSICS LAB – I	**0**	**2**	**1**

List of Experiments

(1) To plot a graph between the distance of the knife-edge from the center of the gravity and the time period of bar pendulum. From the graph, find

(a) The acceleration due to gravity

(b) The radius of gyration and the moment of inertia of the bar about an axis.

(2) To determine the moment of inertia of a flywheel about its own axis of rotation.

(3) To determine the value of acceleration due to gravity using koter's pendulum.

(4) To determine the frequency of A.C. mains using sonometer and an electromagnet.

(5) To determine the frequency of electrically maintained turning fork by Melde's method.

(6) To determine the dispersive power of prism using spectrometer and mercury source.

(7) To determine the wavelength of sodium light by Newton's Ring.

(8) To determine the wavelength of sodium light using diffraction grating.

(9) To determine the refractive index of a prism using spectrometer.

(10) To determine the specific rotation of cane sugar solution with the help of polarimeter.

(11) To find the wavelength of He-Ne Laser using transmission diffraction grating.

(12) To determine the numeral aperture (NA) of a Optical Fibre.

(13) Compute simulation (simple application of Monte Carlo) e.g. Brownian motion, charging & discharging of capacitor.

Note: Any 8-10 experiments out of the list may be chosen. Proper error – analysis must be carried out with all the experiments.

Paper Code: ETCH – 153	**L**	**P**	**C**
Paper: Applied Chemistry Lab – I	**0**	**2**	**1**

List of Experiments

1. To determine the percentage composition of a mixture of Sodium hydroxide and Sodium Chloride.

2. To determine the amount of Sodium Carbonate in the given mixture of Sodium Carbonate and Sodium Bicarbonate.

3. Determine the amount of Oxalic Acid and Sulphuric Acid/Hydrochloric Acid in one litre of solution given standard Sodium Hydroxide and Potassium Permanganate.

4. To determine the Carbonate, Bicarbonate and Chloride contents in irrigation water.

5. To determine the no. of water molecules of crystallization in Mohr's salt provided standard dichromate solution using internal indicator.

6. Determine the amount of Cu in the copper ore solution provided hypo solution.

7. Iodometric Titration of $K_2Cr_2O_7$ v/s $Na_2S_2O_3$ to determine the percentage purity of $K_2Cr_2O_7$ sample.

8. Argentometric titration one each of Vohlard's method and of Mohr's method.

9. Complexometric Titrations.

10. Detrmination of dissolved Oxygen in given sample if water.

TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis (Latest ed.), Revised by G.H. Jeffery, J. Bassett, J. Mendham & R.C. Denney
2. Applied Chemistry: Theory and Practice (Latest ed.), By O.P. Vermani & A.K. Narula

Paper Code: ETCS 155	**L**	**P**	**C**
Paper: Introduction to AutoCAD, Office Automation and Web Design	**0**	**3**	**2**

List of Experiments

1. Use Microsoft-Word to perform the following:
   a) Send out invitation letter to several people using mail merge facility.
   b) Create tabular data in word and insert graph to represent data.
   c) Create a Macro and use it in an application.

2. Use Microsoft-Excel to perform the following:
   a) Create a Macro and use it in an application
   b) Enter the name and marks of 10 students and perform various mathematical functions on it.
   c) Enter first quarter performance of five companies and create a pie chart showing there shareholders in the market.

3. Use Microsoft Power-Point to perform the following
   a) Create a slide show on any subject of your choice using minimum five slides.
   b) Create slideshow in operating sound.
   c) Create an animation using group, ungroup, order, textbox image insert etc.

4. Use HTML to design a Home page for IGIT using all the features of HTML like buttons, frames, marquee check boxes etc..

5. Use AutoCAD to do the following:
   a) Use of Drawing & Editing Properties: Modify Object Properties and a know how of layers, colors and prototype drawing.
   b) Draw line (Poly line, multi line, linear line), polygon, ellipse, circle, arc, rectangle and use cross hatching, regions, boundary, spline, donut, fillet and extent commands.
   c) Dimensioning commands, styles, control scale factors, drawing set-up, grip editing objects snaps, utility commands.
   d) Projection of points, lines and solids,
   e) Section of Solids
   f) Development and Intersection of Surface
   g) Isomeric Projections

Create a WEB page containing hyperlinks to the pages having information about Science and Technology.

Paper Code: ETME-157	**L**	**P**	**C**
Paper: Workshop Practice	**0**	**3**	**2**

UNIT - I

Materials: Spectrography method for finding composition of materials.
Wood Working Shop: Making of various joints, Pattern making.

UNIT - II

Foundary Shop: Bench moulding with single piece pattern and two piece pattern.
Floor moulding – Making of bend pipe mould etc.
Machine moulding – Making of mould using Match-plate pattern.
Core making- Making and baking of dry sand cores for placing in horizontal, vertical and hanging positions in the mould cavity.

Fitting Shop: Learning use of fitting hand tools, marking tools, marking gauge.
Exercises: Jobs made out of MS Flats, making saw – cut filling V-cut taper at the corners, circular cut, fitting square in square, triangle in square.

UNIT - III

Welding Shop: Electric arc welding, Edge preparations, Exercises making of various joints. Bead formation in horizontal, vertical and overhead positions.
Gas Welding: Oxy-Acetylene welding and cutting of ferrous metals.
Soldering: Dip soldering.
Brazing: With Oxy-Acetylene gas.

UNIT - IV

Sheet Metal Shop: Learning use of sheet-metal tools, Exercises: Making jobs out of GI sheet metal. Cylindrical, Conical and Prismatic shapes.

Project Shop: Extrusion of soft metals, Plastic coating of copper wires, Plastic moulding.

Paper Code: ETME-159	**L**	**P**	**C**
Paper: Engineering Graphics Lab	**0**	**2**	**1**

UNIT - I

General: Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications,

Projections of Point and Lines: Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

UNIT - II

Planes other than the Reference Planes: Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Projections of Plane Figures: Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

UNIT - III

Projection of Solids: Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

CADD

UNIT - IV

Isometric Projection

Nomography : Basic Concepts and use.

TEXT BOOKS:

1. Engineering drawing by N.D.Bhatt (Charotar Publications).

REFERENCE BOOKS:

1. Engineering Drawing by S.C.Sharma & Navin Kumar (Galgotia Publications)
2. Engineering Drawing by Venugopalan.
3. Engineering Drawing by P.S.Gill

Paper Code: ETMA-102 **L T C**
Paper: Applied Mathematics - II **3 1 4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

CALCULUS OF SEVERAL VARIABLES:

Partial differentiation, ordinary derivatives of first and second order in terms of partial derivaties, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables and its application to approximate errors. Maxima and Minima of two variables, Langranges method of undermined multipliers and Jacobians.

[No. of Hrs. 12]

UNIT - II

FUNCTIONS OF COMPLEX VARIABLES:

Derivatives of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic Conjugates, Conformal mapping, Standard mappings – linear, square, inverse and bilinear. Complex line integral, Cauchy's integral theorem, Cauchy's integral formula, Zeros and Singularities / Taylor series, Laurents series, Calculation of residues. Residue theorem, Evaluation and real integrals. **[No. of Hrs. 12]**

Unit - III

VECTOR CALCULUS:

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical physical interpretations, Directional: derivatives, Properties.

Line integrals and application to work done, Green's Lemma, Surface integrals and Volume integrals, Stoke's theorem and Gauss divergence theorem (both without proof).

[No. of Hrs. 10]

UNIT - IV

LAPLACE TRANSFORMATION:

Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution and coinvolution theorem. Solving linear differential equations using Laplace transform. Unit step function, Impulse function and Periodic function and their transforms. **[No. of Hrs. 10]**

TEXT BOOKS:

1. E. Kresyzig, "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).
2. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa, 2003 (2^{nd} Ed.).
3. Dr. A. B. Mathur, V. P. Jaggi, "Advanced Engineering Mathematics", Khanna Publishers.

REFERENCE BOOKS:

1. V. V. Mitin, M. P. Polis and D. A. Romanov, "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001.
2. R. Wylie, "Advanced Engineering Mathematics", McGraw-Hill, 1995.

Paper Code: ETPH-104 **L T C**
Paper: APPLIED PHYSICS – II **2 1 3**

INSTRUCTIONS TO PAPER SETTERS:	MAXIMUM MARKS: 75
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Electromagnetic Theory (EMT)

Motion of Charged Particles in crossed electric & magnetic fields, Velocity Selector & Magnetic focussing, Gauss law, continuity equation, inconsistency in Ampere's Law, Maxwell's equations (differential and integral forms), poynting vector, Poynting Theorem (Statement only), propagation of plane electromagnetic waves in conducting and non-conducting medium.

[No. of Hrs. 8]

UNIT - II

Quantum Mechanics & Statistical Physics:

De-Broglie Hypothesis, Davisson Germer experiment, wave function and its properties, expectation value, Wave Packet, Uncertainity principle. Schrodinger Equation for free Particle, Time Dependent Schrodinger Equation, Particle in a box (1-D), Single step Barrier, Tunneling effect.

Qualitative Features of Maxwell Bollzman, Bose-Einstein and Fermi-Dirac statistics distribution, functions & their comparison (no derivation) **[No. of Hrs. 8]**

UNIT - III

Solid State Physics

Formation of energy bands in metals, semiconductors and insulators; intrinsic and extrinsic semiconductors, Fermi energy levels for doped, undoped semiconductors and pn junction; Tunnel diode, Zener diode.

Superconductivity: Meissner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's equation, properties of superconductors & applications.

[No. of Hrs. 8]

UNIT - IV

X-Rays: production and properties, Crystalline and Anorphous solids (Brief) Bragg's Law, Applications.

Ultrasonics: Introduction, Production of Ultrasonics (Magentostriction and piezoelectric methods), engineering applications. **[No. of Hrs. 8]**

TEXT BOOKS:

1. A. BEISER, "Concept of Modern Physics"
2. Rajam, "Atomic Physics"
3. Greiner, "Quantum Physics"
4. Griffth, "Introduction to Electrodynamics"

REFERENCE BOOKS:

1. Jordan & Balmain, "Electromagnetic waves and Radiating Systems"
2. Kittel, "Solid State Physics"
3. R.L. Singhal, "Solid State Physics"
4. Schiff, "Quantum Mechanics"

Paper Code: ETCH – 106 **L T C**
Paper: Applied Chemistry – II **2 1 3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Chemical Bonding:

Potential Energy curve for H_2 molecule, co-ordinate bond, Werner's theory, effective atomic numbers, isomerism in co-ordinate compounds. Hydrogen bonding, Vander Waal's forces, hybridization including d-orbitals, Valence shell Electron Repulsion Theory (VSEPR). Discussion of structures of IF_3, $SnCl_2$, CO_3^{2-}, Molecular Orbital theory, Linear combination of atomic orbitals (LCAO) method. Structures of simple heteronuclear diatomic molecules such as CO, NO, HF, HCl. **[No. of Hrs: 08]**

UNIT - II

Gaseous State: Gas laws and Kinetic theory of gases, Distribution of molecular velocities, Mean free path, Real gases – non ideal behaviour, causes of deviation from ideal behaviour, Vander Waal's equation. Liquefaction of gases. Numericals based on above topics.

Thermochemistry: Hess's Law, Heat of a reaction, Effect of temperature on heat of reaction at constant pressure (Kirchoff's eq.), heat of dilution, heat of hydration, heat of neutralization and heat of combustion, Flame temperature. **[No. of Hrs: 08]**

UNIT - III

Catalysis: Criteria for catalysis : Homogeneous catalysis – acid-base, Enzymatic catalysis, Catalysis by metal salts, Heterogeneous catalysis, concepts of promoters, inhibitors and poisoning, physiosorption, chemisorption, surface area.

The Phase Rule: Definitions of various terms, Gibb's Phase rule, Application of phase rule to one component system – the water system and Sulphur system. Two component system : Lead – Silver, $FeCl_3$ – water, Na_2SO_4 – water. **[No. of Hrs: 08]**

UNIT - IV

Polymers and Composites: Functionality, Degree of polymerization, concept of molecular weight (number average, weight average & numerical based on them), Linear, branched and cross-linked polymers, Tacticity of polymers, Homo and Copolymers (Classification based on repeat unit), Structure – property relationship of polymers. Industrial applications of important thermoplastic, thermosetting polymers, Elastomers, Natural Polymers.

Conducting Polymers : Properties and applications.

Composites : Classification, Fibre and particle reinforced composites. **[No. of Hrs: 08]**

TEXT BOOKS:

1. J.D. Lee, "Inorganic Chemistry", Latest ed.
2. J.C. Kuriacose & J. Rajaram, "Chemistry in Engineering & Technology, Vol I & II, Latest ed.
3. Puri, Sharma & Pathania, "Principles of Physical Chemistry", Latest ed.
4. V.R. Gowarikar, N.V. Viswanathan & Jayadev Sreedha, "Polymer Science", Latest ed.

Paper Code: ETCS 108 ***L*** ***T*** ***C***
Paper: Introduction to Programming **2** **1** **3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Introduction to Programming: Concept of algorithms, Flow Charts, Data Flow diagrams etc., Introduction to the Editing tools such as vi or MS-VC editors, Concepts of the finite storage, bits bytes, kilo, mega and gigabytes. Concepts of character representation, Number Systems & Binary Arithmetic. **[No. of Hrs. 8]**

UNIT - II

Programming using C: The emphasis should be more on programming techniques rather than the language itself. The C Programming language is being chosen mainly because of the availability of the compilers, books and other reference materials.

Example of some simple C program. Concept of variables, program statements and function calls from the library (Printf for example)

C data types, int, char, float etc., C expressions, arithmetic operation, relational and logic operations, C assignment statements, extension of assignment of the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions, C Statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.

[No. of Hrs. 8]

UNIT - III

Iterations and Subprograms: Concept of loops, example of loops in C using for, while and do-while. Optionally continue may be mentioned.

One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations.

Concept of Sub-programming, functions Example of functions. Argument passing mainly for the simple variables. **[No. of Hrs. 8]**

UNIT - IV

Pointers and Strings: Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Unions. Defining C structures, passing strings as arguments Programming examples. **[No. of Hrs. 8]**

TEXT BOOKS:

1. Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
2. Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.

REFERENCE BOOKS:

1. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.
2. Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.

Paper Code: ETME 110	**L**	**T**	**C**
Paper: Engineering Mechanics	**2**	**1**	**3**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Force system: Free body diagram, Eqilibrium equations and applications.

Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrust bearings, Belt drive- derivation of equation.

$$T_1/T_2 = e^{\mu\theta}$$ and its application

[No. of Hrs. 8]

UNIT - II

Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Distributed Force: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia. **[No. of Hrs. 8]**

UNIT - III

Kinematics of Particles: Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.

Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact. **[No. of Hrs. 8]**

UNIT - IV

Kinematics of Rigid Bodies: Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism.

Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.

Shear force and bending Moment Diagram. **[No. of Hrs. 8]**

TEXT BOOKS:

1. A.K.Tayal, "Engg Mechanics", Umesh Publications
2. Sadhu Singh, "Engg Mechanics", Khanna Publishers

REFERENCE BOOKS:

1. Irving H. Shames, "Engg Mechanics", PHI publications
2. U.C.Jindal, "Engg Mechanics", Galgotia Publications
3. Beer & Johnston, "Engg Mechanics", TMH
4. Subramanyam, "Engg Mechanics"

Paper Code: ETEC-112	**L**	**T**	**C**
Paper: ELECTRICAL SCIENCE	**2**	**1**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Circuit Analysis

Ohm's Law, KCL, KVL Mesh and Nodal Analysis, Circuit parameters, energy storage aspects, Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer Theorem, Millman's Theorem, Star-Delta Transformation. Application of theorem to the Analysis of dc circuits. **[No. of Hrs. 8]**

UNIT - II

A.C.Circuits

R-L, R-C, R-L-C circuits (series and parallel), Time Constant, Phasor representation, Response of R-L, R-C and R-L-C circuit to soinusoidal input Resonance-series and parallel R-L-C Circuits, Q-factor, Bandwidth. **[No. of Hrs. 7]**

UNIT - III

Measuring Instruments

Principles, Construction and application of moving coil, moving iron, dynamometer type, induction type instruments, extension of range of ammeter, voltmeter (shunt and multiplier), Two-wattmeter method, for the measurement of power, Cathol-ray Oscilloscope and Applications. **[No. of Hrs. 7]**

UNIT - IV

Transformers

Construction and Working principles and phaser diagrams of Single-phase Transformer, Emf equation, Equivalent circuit, Regulation and efficiency, and Auto transformer.

Rotating Machines

Construction and working principles of dc motor and generator and its characteristics Applications of DC machines

Construction and working principles of 3-φ-Induction motor, Torque-speed characteristics, and Industrial applications. **[No. of Hrs. 10]**

TEXT BOOKS:

1. P.C. Sen "Principles of Electric Machines and Power Electronics", Wiley Eastern 2003.
2. Vincent DEL TORO "Electrical Engineering Fundamental's Prentice Hall India", Ed 2002.

Paper Code: ETEL-114	**L**	**T**	**C**
Paper: Communication Skills – II	**2**	**1**	**3**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Basic Concepts in Communication: Communication as sharing; context of communication; the speaker/writer and the listener/reader; medium of communication; barriers to communication; accuracy, brevity, clarity and appropriateness in communication.

[No. of Hrs: 05]

UNIT - II

Writing Skills: Types of writings (Expository, Descriptive, Analytic, Argumentative, Narrative etc) and their main features. Resumes and CV's and Cover letters. Memos and Notices. Basics of Formal Reports. **[No. of Hrs: 08]**

UNIT - III

Verbal, Non-Verbal and Listening Skills: Elementary Phonetics (Speech Mechanism, The Description of Speech Sounds, The Phoneme, the syllable; Prosodic Features, Word Accent, Features of Connected Speech); Paralanguage and Body language; and Classroom Presentations, Hearing and Listening; Essentials of Good Listening: Achieving ability to comprehend material delivered at relatively fast speed. **[No. of Hrs: 08]**

UNIT - IV

Group Discussion: Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).

[No. of Hrs: 09]

TEXT BOOKS:

1. R. K. Bansal, and J. B. Harrison, "Spoken English For India: A Manual of Speech and Phonetics", Hyderabad: Orient Longman, 1983.
2. Lewis, Hedwig. "Body Language: A Guide For Professionals. New Delhi: Response Books", A division of Sage Publication, 2000
3. Sides, H. Charles, "How to Write & Present Technical Information", Cambridge: CUP, 1999.
4. Forsyth, Sandy & Lesley Hutchison, "Practical Composition", Edinburgh Oliver & Boyd, 1981

Paper Code: ETPH-152	**L**	**P**	**C**
Paper: Applied Physics Lab – II	**0**	**2**	**1**

List of Experiments

1. To determine the value of e/m of electron by J.J. Thomson method.

2. To determine unknown resistance of a wire by Carey Foster's Bridge.

3. To determine the internal resistance of Leclanche cell using potentiometer.

4. To study the charging and discharging of a capacitor and to find out the time constant.

5. To find the thermal conductivity of a poor conductor by Lee's disk method.

6. To study the thermo emf using thermocouple and resistance using Pt. Resistance thermometer.

7. To determine the velocity of ultrasound waves using an ultrasonic spectrometer in a given liquid (Kerosene Oil)

8. To measure the frequency of a sine-wave voltage obtain from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave voltage from two signal generator.

9. To determine the temp. coefficient of resistance of platinum by Callender & Griffith's Bridge.

10. To study Hall effect.

11. To determine plank's constant.

Note:
Atleast 8 experiments must be carried out.
Proper error – analysis must be carried out with all the experiments.

Paper Code: ETCH – 154	**L**	**P**	**C**
Paper: Applied Chemistry Lab – II	**0**	**2**	**1**

List of Experiments

1. Determine the heat of hydration of $CuSO_4.5H_2O/FeSO_4.7H_2O$.
2. Determine the heat of neutralization of strong Acid (say H_2SO_4/HCl) with strong base (NaOH).
3. Determine the heat of neutralization of Weak Acid with strong base.
4. Determine the molecular weight of a substance by Rast Method.
5. Determine the reaction rate constant for 1^{st} order reaction.
6. Determine the surface tension of a liquid using drop weight method.
7. To determine the viscosity of the given liquid (density to be determined).
8. Preparation of a Polymer.
9. To determine the cell constant of a conductivity cell.
10. Titration of strong acid/strong base conduct metrically.

TEXT BOOKS:

1. B.D. Khosla, A. Gulati & V.C. Garg, "Practical Physical Chemistry", Latest ed
2. S.K. Bhasin and Sudha Rani, "Laboratory Manual on Engineering Chemistry", Latest ed.

Paper Code: ETCS 156 **L P C**
Paper: C Programming Lab. **0 2 1**

List of Experiments

1. Write a program to produce ASCII equivalent of given number
2. Write a program to find divisor or factorial of a given number.
3. Write a program to evaluate the following algebraic expressions after reading necessary values from the user
   - ❖ (ax+b)/(ax-b)
   - ❖ 2.5 log x-cos 30+ | x^2-y^2|+sqrt (2xy)
   - ❖ (x^5+10x^4+8x^3+4x+2
4. Write a program to find sum of a geometric series
5. Write a program to cipher a string
6. Write a program to check whether a given string follows English capitalization rules
7. Write a program to find sum of the following series
   1+ ½ + 1/3 +_____+1/20
8. Write a program to search whether a given substring exist in an input string or not and then delete this string from input string.
9. Write a recursive program for tower of Hanoi problem
10. The fibonacci sequence of numbers is 1,1,2,3,5,8……. Based on the recurrence relation
    F(n)=F(n-1)+F(n-2)for n>2
    Write a recursive program to print the first m Fibonacci number
11. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
    a) Addition of two matrices
    b) Subtraction of two matrices
    c) Finding upper and lower triangular matrices
    d) Trace of a matrix
    e) Transpose of a matrix
    f) Check of matrix symmetry
    g) Product of two matrices.
12. Write a program that takes two operands and one operator from the user perform the operation and then print the answer
13. Write a program to print the following outputs:

```
1                                   1
2   2                           2   2
3   3   3                   3   3   3
4   4   4   4               4   4   4   4
5   5   5   5   5           5   5   5   5   5
```

14. Write functions to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib) Also write the main program.
15. Write a menu driven program for searching an sorting with following options:-
    a) Searching (1) Linear searching (2) Binary searching
    b) Sorting (1) Insersection sort (2) Selection sorting
16. Write a program to copy one file to other, use command line arguments.
17. Write a program to mask some bit of a number (using bit operations)
18. An array of record contains information of managers and workers of a company. Print all the data of managers and workers in separate files.

Paper Code: ETME 158	**L**	**P**	**C**
Paper: Engineering Mechanics Lab	**0**	**3**	**2**

List of Experiments

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the Wheel and Axle
7. To determine the MA, VR, η of Worm Wheel (2-start)
8. Verification of force transmitted by members of given truss.
9. To verify the law of moments using Bell crank lever
10. To find CG and moment of Inertia of an irregular body using Computation method.

Paper Code: ETEC 160	**L**	**P**	**C**
Paper: Electrical Science Lab	**0**	**2**	**1**

List of Experiments

1. Verification of Thevenin's theorem
2. Verification of Superposition theorem
3. Phasor Diagram and Power factor of LCR circuit.
4. Measurement of Power and Power factor in single phase Load using three ammeters/voltmeters.
5. Calibration of Energy Meter/Wattmeter/Voltmeter/Ammeter
6. Two wattmeter method of measuring power in three phase circuit (resistive load only)
7. Load test on Single Phase Transformer, Regulation and Efficiency of Transformer
8. Short Circuit/Open Circuit tests on Single Phase transformer
9. Measure the armature and field resistance of a D.C. Machine
10. Connection and starting of a Three Phase Induction Motor using direct on line or Star Delta Starter.
11. Starting and Speed Control of a D.C. shunt motor
12. Resonance

Paper Code: ETMA-201 **L T C**
Paper: Applied Mathematics –III **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Laplace Transformation: Laplace Transformation, Inverse Laplace transformation Convolution Theorem, application to linear differential equations with constant coefficients, Unit step function, impulse functions/periodic functions **[No. of Hrs.: 11]**

UNIT – II

Fourier Series: Fourier Series, Euler's formulae, even and odd functions, having arbitrary periods, half range expansion, Harmonic analysis

Fourier Transforms: Fourier transform, Sine and Cosine transforms, Application to differential equations **[No. of Hrs.: 11]**

UNIT – III

Special Functions: Beta and Gamma functions, Bessels functions of first kind, Recurrence relations, modified Bessel functions of first kind, Ber and Bei functions, Legendre Polynomial, Rodrigue's formula, orthogonal expansion of function **[No. of Hrs.: 11]**

UNIT – IV

Partial Differential Equation: formation of first and second order linear equations, Laplace, Wave and heat conduction equation, initial and boundary value problems **[No. of Hrs.: 11]**.

Text Books:

1. Engineering Mathematics , B. S. Grewal, Khanna Publication Aug 2000.
2. Engineering Mathematics , Jaggi & Mathur – Khanna Publication, 1985

Reference Books:

1. Engineering Mathematics , V.P Mishra, Galgotia Publication 2000.
2. Advanced Engineering Mathematics, Louis C. Barsett, Additional McGraw hill Int. 6^{th} edition.

Paper Code: ETIC-203	**L**	**T**	**C**
Paper : Analog Electronics	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Semiconductor Diodes and Rectifiers: Introduction, general characteristics, energy levels, extrinsic n & p type, ideal diode, basic construction and characteristics, DC & AC resistance, equivalent circuits, drift & diffusion. Currents, transition & diffusion capacitance, reverse recovery times, temperature effects, diode specifications, different types of diodes (zener, vaqrator, schottky, power tunnel, photodiode & LED). Half wave & Full wave rectifiers.

[No. of Hrs.: 11]

UNIT – II

Bipolar junction transistor: Introduction, Transistor, Construction, transistion operations, BJT characteristics, loadline, operation point, leakage currents, saturation and cut off mode opf operation ebermall's model.

Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias stability with resfpect ot varijation in Ico, V_{BE} & β stabilization factors. Thermal stability.**[No. of Hrs.: 11]**

UNIT - III

Small signal amplifiers : CB, CE, CC configuration,hybrid model for transistor at low frequencies, RC coupled amplifiers.field Effect Transistor: Classification & characteristics, operating point, blasing. Entancement & depletion type MOSFETS. **[No. of Hrs.: 11]**

UNIT - IV

Operational Amplifier : Ideal OPAMP, OPAMP STAGES, OPAMP Parameters. Equivalent circuit, Ideal voltage transfer curve, open loop OPAMP configuration, OPAMP applications: comparator, current sources, rectifiers, first and second order filters, summer, integrator, differentiators, clipper, clamper, waveform generators, instrumentation amplifier,log antilog amplifier. **[No. of Hrs.: 11]**

Text Books:

1. J. Millman and Halkias, "Electronic devices and circuits" TMH, 1999.
2. Salivahanan, Suresh Kumar, Vallavaraj, "Electronic devices and circuits", TMH, 1999

Reference Books:

1. J. Millman and Halkias, "Integrated Electronics, Analog & Digital Circuits & Systems" TMH – 2000.
2. Boylestad & Nashelsky, "Electronic Devices & Circuit Theory" PHI – VIth Edition.
3. Sedra & Smith, "Micro Electronic Circuits" Oxford University Press, 2000
4. J.B.Gupta, "Electronic Devices & Circuits" S. K. Kataria, IInd Edition.

Paper Code : ETEC-205	**L**	**T**	**C**
Paper : Circuits & Systems	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction to continuous and discrete signals, their classification and types, periodic waveforms and signal synthesis, LTI systems and their properties; system modeling in terms of differential equations and transient response of R, L, C circuits for impulse, step, ramp, sinusoidal and exponential signals. **[No. of Hours: 11]**

UNIT - II

Laplace Transform: Review of properties and applications of Laplace transform of complex waveform and transient response of R, L, C series, parallel, series-parallel circuits for all kinds of excitations. **[No. of Hours: 11]**

UNIT - III

Graph theory and its applications, two port networks – z, y, ABCD, h, g, inverse ABCD parameters their interconversion, interconnection of two 2-port networks, concept of transform impedance, Network theorems: Reciprocity, Superposition, Thevenin, Norton, Millman, Maximum Power Transfer and Tellegan **[No. of Hours: 11]**

UNIT - IV

Elements of Network Synthesis: Foster's I and II, Cauer's I& II forms, Synthesis of LC, RC, RL Networks **[No. of Hours: 11]**

Text Books:

1. Valkenburg, " Network analysis" PHI, 2000.
2. D. R. Choudhary, "Networks and Systems" New Age International, 1999.

Reference Books

1. Bhise, Chadda, Kulshreshtha, " Engineering network analysis and filter design" Umesh publication, 2000.
2. Kuo, "Network analysis and synthesis" John Weily and Sons, 2nd Edition.

Paper Code ETIC-207	**L**	**T**	**C**
Paper: Electrical Machines	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Unit I

Basic Concept of Rotating Machines:

General working principle and constructional features. Type of windings, generation of voltage, production of torque.

D.C.Machine:

Constructional features of generators and motors, commutator action armature reaction, E.M.F. equation, classification of D.C. Generator and motors, characteristics and applications. Methods of speed control & starting of D.C.Motors. **[No. of Hrs.: 11]**

Unit-II

Transformer:

Basic principle and construction, losses transformer testing efficiency and voltage regulation, auto transformers. Three phase transformer three winding transformer.

Single Phase Motors:

Principle of working-double revolving theory, starting characteristics and application of single Phase motor and universal motor. **[No. of Hrs.: 11]**

Unit-III

Polyphase Induction Motors:

Constructional features, rotating field, principle of operation. Equivalent circuit and phasor diagram, torque, maximum torque slip characteristics. No load and block rotor tests, equivalent circuit determination, method of starting and speed control. **[No. of Hrs.: 11]**

Unit-IV

Synchronous Machines:

Salient pole and cylindrical rotor machines. Synchronous generator, distribution and coil span factors, E.M.F. equation. Salient pole generator phase diagram.

Synchronous motor – principle of working, phasor diagram, v-curves, starting.

Synchronous condenser and power factor improvement. **[No. of Hrs.: 11]**

Text Books:

1. Electrical Machines, I.J Nagrath and D.P.Kothari, TATA Mc Graw Hill,2000
2. Electrical Machines, Fitzgeral, A.E. , C.Kingslay & Umans Mc Graw Hill.

Reference:

1. P.S.Bimbra Electrical Machines. Dhanpat Rai Publishers,2000
2. Ashfaq Hussain : Electrical Mechines- Dhanpat Rai

Paper Code :ETIC-209 **L T C**
Paper: Instrumentation **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	MAXIMUM MARKS: 75
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Unit-I

Basic Building Blocks of an Instrumentation System:

Scope and necessity of instrumentation. Names of important process variables their units. Building blocks of instrumentation system. Various testing signals.

Instrument Selection :

Factor affecting instrument selection. Accuracy precision, resolution, sensitivity, hysteresis, reliability, serviceability. Static and dynamic response. Environmental, effects. Calibration of instruments. **Errors:** Source and classification of errors, remedial action grounding and guarding, precautions for error reduction, elimination. **[No. of Hrs: 11]**

Unit -II

Temperature Measurements: Temperature Measurement an industry seaback effect, peltier effect, Temperature Scales and conversions. Advantage and limitation of Vapour, filled thermometer, gas filled thermometer, Liquid filled thermometer, mercury in glass thermometer, Bimetailic thermometer, Pressure spring thermometer, thermistors, pyrometers, Thermomcouple. **[No. of Hrs: 11]**

Unit-III

Level Measurements: Importance of level measurement, Principle of working material of construction. Advantage and limitation of instruments such as visual level indicators, ordinary float type using string and pulleys. Purge method of measuring level, Buoyancy method, Resistance probes for level measurement, Ultrasonic level, Measurement, Gamma ray level measurement, level limit switches, level measurement in pressure vessels solid level measurement techniques. **Flow :-** Mechanical flow meter, primary meters, secondary meters, Interferential type, principle of operation, Rotating vane, propeller type. **[No. of Hrs: 11]**

Unit –IV

Display Method:

Various indicating Method, integrating and recording methods and their combinations. Merits and Demerits of circular charts and strip chart recorders. Basics of printing devices. Scanning and data logging. **[No. of Hrs: 11]**

TEXT BOOKS:

1. A course in Electrical & Electronic measurement & Instrumentation, Sawhney, A.K. Dhanpat Rai & sons,20000
2. Measurement Systems Application & Design, Doebelin, Mcgraw hill,4th Edition

REFERENCE BOOKS:

1. Liptak, B. G. (E.d.), "Instrument Engineers Handbook", vol. I to III, M. C. Graw Hill
2. Modern electronics instrumentation & measurement Techniques,W.D. Cooper, PHI,1998

Paper Code: ETCS-211	**L**	**T**	**C**
Paper: Data Structures	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Fundamentals of algorithm analysis: Big 'O' notations, Time and space complexity of algorithms., Elementary data structures and their applications

Arrays: ordered lists, representation of arrays, sparse matrices, linked lists: singly and doubly linked lists, stacks, queues, multiples stacks and queues, Applications: polynomial arithmetic, infix, postfix and prefix arithmetic expression conversion and evaluations. **[No. of Hrs: 12]**

UNIT – II

Trees: Binary trees: Definition, traversal, threaded binary tree, Counting Binary Tree.

Graphs: Representation, traversal, connected components, shortest path and transitive closure, topological sort, activity network, critical path, path enumeration. Dijkstra's Algorithm, Floyd Warshall's Algorithm, Minimum Spanning Tree Definitions. **[No. of Hrs: 11]**

UNIT – III

Searching & Sorting: Binary Search Tree, Insertion & Deletion, AVL Trees, Hash function, Hash table, Internal sort: Radixsort, Insertion sort, Exchange sort, Selection sort, Quicksort, Shellsort, Mergesort, Heaport, External sort: K-way mergesort, balanced mergesort, polyphase mergesort **[No. of Hrs: 11]**

UNIT – IV

Files: Files, Queries and sequential organization; Cylinder surface indexing, Hashed Indexed, Tree Indexing, B-Trees, Trie Indexing, Sequential file organizational, random file organization, Hashed file organization, Inverted files, cellular partitions. **[No. of Hrs: 10]**

TEXT BOOKS:

1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Booksource Pvt. Ltd, 1999.
2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI, 2000.

REFERENCES BOOKS:

1. Schaum's outline series, "Data Structure", TMH, 2002
2. Y. Langsam et. al., "Data Structures using C and C++", PHI, 1999.
3. Yashwant Kanetkar, "Data Structure through C", BPB, 2005.

Code No. : ETIC 251	**L**	**P**	**C**
Paper: Analog Electronics Lab.	**0**	**2**	**1**

Practical will be based on Analog Electronics. Some lab experiments must be performed using any circuit simulation software e.g. PSPICE.

Code No. : ETIC 253	**L**	**P**	**C**
Paper: Circuits & Systems Lab.	**0**	**2**	**1**

Practical will be based on Circuits & Systems. Some lab experiments must be performed using any circuit simulation software e.g. PSPICE.

Code No. : ETIC 255	**L**	**P**	**C**
Paper: Electrical Machines Lab.	**0**	**2**	**1**

Practical will be based on Electrical Machines.

Code No. : ETCS 257	**L**	**P**	**C**
Paper: Data Structures Lab.	**0**	**2**	**1**

Practical will be based on Data Structures.

Paper Code: ETIC – 202 **L T C**

Paper: Object Oriented Programming using C++ **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction: Introducing Object-Oriented Approach related to other paradigms (functional, data decomposition), Characteristics of Object-Oriented Languages.

Basic terms and ideas: Abstraction, Encapsulation, Information hiding, Inheritance, Polymorphism, Review of C, Difference between C and C++, cin, cout, new, delete operators.

[No. of Hrs: 11]

UNIT – II

Classes and Objects: Abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behavior of an object, Constructors and destructors, instantiation of objects, Default parameter value, Copy Constructor, Static Class Data, Constant and Classes, C++ garbage collection, dynamic memory allocation. **[No. of Hrs. 11]**

UNIT – III

Inheritance and Polymorphism: Inheritance, Types of Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Type of Polymorphism – Compile time and runtime, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric polymorphism, Generic function – template function, function name overloading, Overriding inheritance methods

[No. of Hrs: 11]

UNIT – IV

Files and Exception Handling: Persistant objects, Streams and files, Namespaces, Exception handling, Generic Classes

Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors. **[No. of Hrs: 11]**

TEXT BOOKS:

1. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997.
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. Schildt Herbert, "C++ Programming", 2nd Edition, Wiley DreamTech.

REFERENCE BOOKS:

1. D . Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004.

Paper Code: ETIC – 204	**L**	**T**	**C**
Paper: Measurement Techniques	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

A. C. Potentiometer: Theory and operation of coordinate and polar types A. C. Potentiometer, Errors and Applications.

A. C. Bridges: De Sauty Bridge, Low and High Voltage Schering Bridge, Anderson Bridge, Maxwell Bridge, Wein Bridge for Frequency measurement, Residuals in Bridges, Use of Shielding in Bridges, Wagner Earth Connection, C. R. O. and Head Phones as detectors.

[No. of Hrs. 11]

UNIT - II

Instrument Transformers:

Construction, operation, errors in current transformers, in potential transformers, compensation techniques for errors in current transformers, potential transformers, testing of current transformers, absolute and comparison methods. **[No. of Hrs. 11]**

UNIT - III

Instruments and Meters:

Induction type instruments; Theory, operation, adjustments and calibration of single phase energy meter, Polyphase energy meter, Ampere Hour Meters, Measurement of Volt-ampere and reactive voltamperes, Power Factor Meters, Frequency Meters, Synchroscopes, Phase sequence indicators. **[No. of Hrs.: 11]**

UNIT - IV

Electronic Measurement Instruments:

Vacuum tube voltmeter, Transistor Voltmeter, General purpose Oscilloscopes, Triggered Sweep Oscilloscopes, Frequency and time measurement. **[No. of Hrs.: 11]**

Text Books:

1. A course in Electrical & electronics Measurement & Instrumentation, Sawhney, A. K., Dhanpat Rai & Sons,2000.
2. Modern electronics instrumentation & measurement Techniques,W.D. Cooper, PHI,1998

Reference Books:

1. Electrical Measurements & measuring instruments, Golding & widdis, Wheeler Publication 1999 2. Electronic Instrumentation,H.S Kalsi,TMH,1999

Paper Code: ETIC – 206	**L**	**T**	**C**
Paper: Digital Electronics	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Number Systems and Codes:

Number systems, binary number systems, octal number system, hexadecimal number system, signed & unsigned numbers, different types of codes, binary operations – addition, subtraction, multiplication, division, 1s and 2s complement of a number.

Logic Circuits:

Introduction to Boolean algebra and Boolean variables, logical functions, usng Karnaugh map and qutno macluskoy methods multiplexes, de multiplexes, encoders, address, subtractions, parity generators, parity checkers, code converter, flip-flops, JK flip-flops, Registers and counters, introduction, series and parallel registers, synchronous and asynchronous counters, up and down counters, ring counters and mod counters. **[No. of Hrs.:11]**

UNIT - II

D / A and A / D Converters:

Introduction, weighted register D / A converter, binary ladder D / A converter, specification for D / A converter, parallel A / D converter, Successive approximation A / D converter, single and dual slope A / D converter, A / D converter using voltage to frequency conversion, A / D converter using voltage to time conversion counter type A / D converters. **[No. of Hrs.:11]**

UNIT - III

Semiconductor Memories:

Introduction, memory organization, classification and characteristics of memories, sequential memories, read only memories, read and write memories, content addressable memories, programmable logic arrays, charged coupled device memory. **[No. of Hrs.:11]**

UNIT – IV

Digital Logic Families:

Introduction, characteristics of digital ICs, register transistor logic, integrated injection logic, direct coupled transistor logic, code transistor logic and transistor logic, Emitter coupled logic, MOS logic, high threshold logic families. **[No. of Hrs.:11]**

Text Books :

1. Digital Electronics, R. P. Jain, TMH,2002
2. Digital Principles & Applications, MalvinoLeach, TMH, 2000.

Reference Books :

1. Digital Electronics, Bignell & Donovan, Thomson Asia Pvt. Ltd. ,2001.
2. Digital Circuit & logic Design ,S.C Lee ,PHI 2001

Paper Code: ETIC – 208	**L**	**T**	**C**
Paper: Control System-I	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Input / Output Relationship: Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula. **[No. of Hrs.: 11]**

UNIT - II

Time – Domain Analysis:

Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in anity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.

[No. of Hrs.: 11]

UNIT - III

Frequency Domain Analysis:

Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots), gain and phase margins, relative stability, Correlation with time domain, constant M & N circles, close loop frequency responses, from open loop response. **[No. of Hrs.: 11]**

UNIT – IV

Concept of Stability: Asymptotic stability and conditional stability, Rough – Hurwitz criterion, Nyquist stability criterion, Root Locus plots and their applications.

Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed ioop systems using compensation techniques, feedback compensation using P, PI, PID controllers. **[No. of Hrs.: 11]**

Text Books:

1. Automatic Control System Engineering, Dr.N.K Jain ,Dhanpat Rai Publication,2005
2. Control System Engineering, I. J. Nagrath & M. Gopal, New Age International,2000

Reference Books :

1. Modern Control Engineering, K. Ogata, PHI 2002
2. "Automatic control system", B. C. Kuo, Prentice Hall of India, 2001

Paper Code: ETIC – 210	**L**	**T**	**C**
Paper: Industrial Instruments	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Measurement of Force and Torque: Mass, weight and Force, Measuring methods, Mechanical weighing systems, Elastic Transducers, Ballistic Weighing, Hydraulic and pneumatic system, Torque Measurement, Transmission Dynamometers, Combined Force and Moment Measurement.

Differential pressure meters : Type, constructional features, working and applications, orifice plate, venturi tube, flow nozzle, pivot tube, different transducers, variable area flow meters, Rotameters, Electromagnetic and ultrasonic flow meters, mass flow meters, target flow and turbine flow meters. **[No. of Hrs.: 11]**

UNIT - II

Pressure: Principle of measurement of absolute and gauge pressure. Unit of pressure and conversion different type of manometers. Principles of working, bellows, Bourdon, Capsule and diaphragm, Pressure switches, vacuum gauge, pirani gauge, calibration of pressure gauge, dead weight.

Density Measurement: Application and selection, liquid density – displacement and float type densitometry, hydrometer, hydrostatic densitometry, miscellaneous densitometry, oscillating densitometer radiation densitometer, vibrating denstiometer, weighing a fixed volume & gas densiometer. **[No. of Hrs.: 11]**

UNIT - III

Moisture Measurement: Various definitions including wet basis & dry basis, Principle Moisture – sensing devices – including electrical conductivity methods, electric capacitance methods, aluminium oxide impendence sensors, radio frequency absorption, microwave absorption, combined microwave & gama absorption, infrared absorption meters. The relatively new vibrating quartz crystal moisture sensors. **[No. of Hrs.: 11]**

UNIT – IV

Measurement of Dimension, Displacement, Linear Velocity and Vibration: Gauge blocks, surface plates, temperature problems, use of comparators, optical methods, use of optical flats & monochromatic light for dimensional comparison, the interferometer, long path interferometer, surface roughness, displacement transducer, vigrometer, accelerometers.

Humidity: Absolute humidity, relative humidity, Dew.Point, principle of instrument for measure of humidity. **[No. of Hrs.: 11]**

Text Books:

1. A course in Electrical & Electronics Measurement & Instrumentation, Sawhney, A. K." Dhanpat Rai & Sons.2000.
2. Instrumentation measurement & Analysis ,Nakra Chaudhary ,TMH,2004

Reference Books:

1. Liptak, B. G. (E.d.), "Instrument Engineers Handbook", vol. I to III, M. C. Graw Hill.
2. Sensors & transducers Patranabis D.,PHI 2003

Paper Code: ETIC – 212	**L**	**T**	**C**
Paper: Fluid Mechanics and Thermodynamics	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Fluid and flow, fluid properties, Pressure variation in a static fluid hydrostatic forces on plane and curved surfaces, stability of sub-merged and floating bodies.General description of fluid motion, stream lines, continuity equation, particle acceleration, velocity gradient, rotation and rate of strain. **[No. of Hrs.: 11]**

UNIT - II

Euler's equation, Bernoulli's Equation, Momentum equation, energy equation and their applications.

Newton's Viscosity law, laminar and turbulent flows, drag and lift, introduction to boundary layer flows, flow through pipes and plane surface. **[No. of Hrs.: 11]**

UNIT - III

Concepts of system, properties, equilibrium, Zeroth law, heat and work, First Law of thermodynamics, non flow and steady flow energy equations, Second law of thermodynamics, reversibility entropy.

Properties of ideal gases, various thermodynamic processes. Properties of vapours, Steam Tables and Mollier diagram. Properties of air water vapour mixtures, introduction to psychromety. **[No. of Hrs.: 11]**

UNIT – IV

Introduction to heat transfer, modes, concepts of driving potential, thermal resistance and over all heat transfer coefficient. **[No. of Hrs.: 11]**

Text Books:

1. Engineering Thermodynamics , P. K. Nag – Tata Mc Graw Hill.2004
2. Fluid Mechanics , Modi & Sethi.Standard book House 2005.

Reference Books :

1. Basic Thermodynamics, Joel (Lower Edition) TMH .
2. Heat & Thermodynamics , ballney Khanna Publication 2003.

Code No. : ETIC 252	**L**	**P**	**C**
Paper: Object Oriented Programming using C++ Lab.	**0**	**2**	**1**

Practical will be based on Object Oriented Programming using C++.

Code No. : ETIC 254	**L**	**P**	**C**
Paper: Measurement Techniques Lab.	**0**	**2**	**1**

Practical will be based on Measurement Techniques.

Code No. : ETIC 256	**L**	**P**	**C**
Paper: Digital Electronics Lab.	**0**	**2**	**1**

Practical will be based on Digital Electronics.

Code No. : ETIC 258	**L**	**P**	**C**
Paper: Control System - I Lab.	**0**	**2**	**1**

Practical will be based on Control System - I. Some lab experiments must be performed using any circuit simulation software.

Code No. : ETIC 260	**L**	**P**	**C**
Paper: Industrial Instruments Lab.	**0**	**2**	**1**

Practical will be based on Industrial Instruments.

Paper Code: ETIC – 301	**L**	**T**	**C**
Paper: Communication System	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Unit – I

Elements of communication systems, signal noise, linear modulation, exponential modulation. Sampling, and pulse modulation, digital modulation (ASK, PSK, ESK) (PAM, PDM, PCM, DM). Demodulation for various modulation systems, SNR for various modulation systems.

[No. of Hrs.:11]

UNIT -II

Review of Digital Modulation systems, Bandwidth compression, Digital multiplexing, MODEM, Overview of Transmission media, Data Transmission,.Mutual information Shannon's Theorem Sowzce coding, channel coding and channel capacity theorem. Huffman code, Lempel –ziv code. **[No. of Hrs.:11]**

UNIT – III

Introduction to telephone exchange systems, Telecommunication traffic, circuit switching, Message switching and packet switching, Protocol structures in Networks, Network interface X-25 standard. Routing in Packet Networks, Resource sharing and Multiple access techniques.

[No. of Hrs.:11]

UNIT - IV

A Satellite Base ALOHA Technique, Terrestrial Packet Radio system, Data Networking, Packet switching and common carriers, Value-Aided Networks, Combining Circuit and Packet switching. **[No. of Hrs.:11]**

TEXT BOOKS:

1. Electronics Communication System, George Kennedy, TMH 1993
2. Computer networks, Tennenbaum,PHI,2003
3. Analog& Digital Communication, B.P. Lathi, Oxford University Press 1999.

REFERENCE BOOKS:

1. Introduction to analog & Digital Communication, Simon Haykin ,Willey,2000
2. Digital & Analog Communication system , K. Sam Shanmugam John Wiley & sons 1998.

Paper Code: ETIC – 303	**L**	**T**	**C**
Paper: Microprocessor System – I	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, its internal architecture, addressing modes, Microprocessor programming system timing.
Various data transfer schemes, Interfacing with memory (ROM, SRAM, DRAM etc.)

[No. of Hrs.: 11]

UNIT - II

Cache controller and cache memory system. Input/Output Interface Chips : 8212, 8255, 8155

[No. of Hrs.: 11]

UNIT - III

8279, 8237 Interrupts and their processing, 8259, Interrupt interface circuits using 8259.

[No. of Hrs.: 11]

UNIT – IV

Microcontrollers Interfacing techniques with A/D, D/A, stepper motor, printer, keyboard, output displays etc. Introduction to 16/32, bit processor, Real mode, virtual 808 Protected.

[No. of Hrs.: 11]

TEXT BOOKS:

1. Microprocessor Architecture, Programming & Application with 8085, Gaonkar, Penram Int. publication 2000.

2. Microprocessor & interfacing programming & hardware , Hall D.V, TMH ,1991

REFERENCE BOOK:

1. Microprocessor principles & applications ,Gilmore ,TMH,2000

Paper Code: ETIC – 305 **L T C**
Paper: OPERATING SYSTEMS **3 1 4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction, What is an Operating System, Simple Batch Systems, Multiprogrammed Batches systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems

Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging

Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations, Demand Segmentation **[No. of Hrs.: 12]**

UNIT – II

Processes: Process Concept, Process Scheduling, Operation on Processes, Cooperating Processes, Interprocess Communication

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Algorithm Evaluation

Process Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Synchronization in Solaris 2, Atomic Transactions **[No. of Hrs.: 11]**

UNIT – III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock Handling.

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Device Characteristics-Hardware Consideration, Input or Output Devices, Storage Devices, Channels and Control Units, Independent Device Operation, Buffering, Multiple Paths, Block Multiplexing, Device Allocation Consideration,

Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability, Stable-Storage Implementation **[No. of Hrs.: 11]**

UNIT – IV

Information Management: Introduction, A Simple File System, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File System File-System Interface: File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File-System Implementation: File-System Structure, Allocation Methods, Free-Space Management, Directory Implementation, Efficiency and Performance, Recovery. **[No. of Hrs.: 10]**

TEXT BOOKS:

1. Silbersachatz and Galvin, "Operating System Concepts", Pearson, 5th Ed., 2001
2. Dr. R. C. Joshi, "Operating Systems", Wiley Dreamtech, 2005.

REFERENCES BOOKS:

1. Tannenbaum, "Operating Systems", PHI, 4th Edition, 2000
2. E. Madnick, J. Donovan, "Operating Systems", Tata McGraw Hill, 2001

Paper Code: ETIC – 307 **L T C**
Paper: Pneumatic And Hydraulic Instrumentation **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction: Basic requirement for Pneumatic System, Servicing compressed air: Air compressors, air treatment stages, pressure regulation(FRL unit) Introduction to hydraulic system comparison of pneumatic & hydraulic system. **[No. of Hrs.: 11]**

UNIT – II

Pneumatic & hydraulic Actuators, cylinders Spring, spring less, spring with positioner piston & motor actuators, electro pneumatic actuators, cylinder lubrication, cylinder with sensors, hydraulic actuators, control valves types of control valves, basic pneumatic circuits.

[No. of Hrs.: 11]

UNIT – III

Timing & sequence diagram : Cylinder sequencing hydraulic & pneumatic Accessories pneumatic telemetry systems: Pneumatic temperature & pressure transmitters their working & applications, electrical control in pneumatic circuit. Introduction to PLC, architecture of PLC , Programming of PLC. **[No. of Hrs.: 11]**

UNIT – IV

Pneumatic & Hydraulic Controllers(P,PI,PID) ,P&ID diagrams, converters : I/P,P/I ,Pneumatic Relay, Pneumatic Sensors Flapper nozzle assembly. Maintenance & troubleshooting of pneumatic & hydraulic systems. Introduction to Mechatronics & its approach.

[No. of Hrs.: 11]

TEXT BOOKS:

1. Process Control Instrumentation Technology, C. D. Johnson ,PHI, 2002
2. Computer based Industrial Control, Krishankant PHI,2004
3. Pneumatic & Hydraulic, Andrew Parr PHI, 1999.

REFERENCE BOOKS:

1. Process Industrial Instruments & Control Handbook D.Considine , McGraw Hill ,1993.
2. Instrument Engineers Handbook ,B.G liptak ,BH Publication ,1999.

Paper Code: ETIC – 309	**L**	**T**	**C**
Paper: Control System - II	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

State Space Representation of Continuous and Discrete Systems: Solving the time invariant sate equation, State transition matrix. Controllability and observability criteria for time-back – Design of State observers. **[No. of Hrs.: 11]**

UNIT – II

Introduction to Non-Linear Feedback Control Systems: Describing function. Variation Calculus: Fixed end point problems-Euler-Lagrange Equation, variable end point problem and the transversality conditions. Isoperimetric problem. Limitations of calculus of variation.

[No. of Hrs.: 11]

UNIT - III

Pontryagin's Maximum Principle: Index of performance and guideline to its choice-Lagrange, Hamiltonian, derivation of canonical equations for optimization, Hamilton-Jacobin equation. Application of Pontryagin's Maximum Principle **[No. of Hrs.: 11]**.

UNIT - IV

Linear Regulator Theory, Matrix – Riccati Equation, Minimum time problems for conservative, Second and higher order systems. Minimum model problems, Minimum energy problems. Introduction of Identification & Adaptive Control. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Modern control System Theory M.Gopal, New Age Int. 2003.
2. State Variable & Digital control method , M.Gopal TMH,2003

REFERENCE BOOKS:

1. Optimal Control, . Athens & Falb, McGraw Hill
2. Modern Control System, Ogata ,Pearson Education,2002

Paper Code: ETIC – 311	**L**	**T**	**C**
Paper: Linear Integrated Circuits	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

IC OP-AMP applications: OP-AMP Fundamentals (brief review of differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics) Basic building blocks using OP-AMPS. **[No. of Hrs.: 11]**

UNIT – II

Inverting / Non inverting VCVS, Integrators, Differentiators, CCVS and VCCS, Instrumentation Amplifiers, Biquad Filter (LP, HP, BP and Notch), Oscillators. Logarithmic Amplifiers, Log/Antilog Modules, Precision Rectifier **[No. of Hrs.: 11]**

UNIT - III

Comparator, Schmitt Trigger, Square and Triangular Wave Generator, Monostable Multivibrator.

IC OTA application: Basic Building Blocks using PTA, Electronically Programmable Functional circuit examples. **[No. of Hrs.: 11]**

UNIT - IV

Voltage Regulators: OP-AMP Regulators, IC Regulators, Fixed Voltage Regulators (78/79, XX), 723 IC Regulators (Current Limiting, Current Fold Back); SMPS. IC Timer (555) applications: Monostable and Astable operation. PLL: Principle, Definitions and applications. Applications of Analog switches: Programmable Gain Amplifiers. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. OP Amps and Linear Integrated circuits ,Gayakwad PHI,2000
2. Design of Analog Intgrated Circuits and Systems, Keneth Laker,T MH,2000

REFERENCE BOOKS:

1. Microelectronic Circuits , Sedra Smith , Oxford University Press 2000
2. Linear & nonlinear circuit, Chua,Desor, Kuh , Mc-Graw Hill ,1987.

Code No. : ETIC 351	**L**	**P**	**C**
Paper: Microprocessor System - I Lab.	**0**	**2**	**1**

Practical will be based on Microprocessor System - I.

Code No. : ETIC 353	**L**	**P**	**C**
Paper: Pneumatic & Hydraulic Lab.	**0**	**2**	**1**

Practical will be based on Pneumatic & Hydraulic.

Code No. : ETIC 355	**L**	**P**	**C**
Paper: Control System - II Lab.	**0**	**2**	**1**

Practical will be based on Control System - II.

Code No. : ETIC 357	**L**	**P**	**C**
Paper: Linear Integrated Circuits Lab.	**0**	**2**	**1**

Practical will be based on Linear Integrated Circuits.

Code No. : ETIC 359	**L**	**P**	**C**
Paper: *Practical Training	**0**	**0**	**1**

*NUES
Practical training conducted after fourth semester will be evaluated in the fifth Semester based on Viva-Voce.

Paper Code: ETIC – 302	**L**	**T**	**C**
Paper Microprocessor System – II	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction to Microprocessors: Evolution of Microprocessors, Register Structure, ALU, BUS Organization, Timing and Control.Architecture of a 16-bit Microprocessors: Internal Organization of 8086, Bus Interface Unit, Execution Unit, Register Organization, Sequential Memory Organization, Bus Cycle **[No. of Hrs.:11]**

UNIT – II

Assembly Language Programming: Addressing Modes, Data Transfer Instructions, Arithmetic and Logic Instructions, Program Control Instructions (Jumps, Conditional Jumps, Subroutine Call) Loop and String Instructions, Assembler Directives, Parameter Passing and Recursive Procedures. **[No. of Hrs.:11]**

UNIT – III

CPU Module Design: Signal Description of Pins of 8086 and 8088, Clock Generation, Address and Data bus Demultiplexing, Buffering, Memory Organization, Read and Write Cycle Timings, Interrupt Structures, Minimum Mode CPU Module, Maximum Mode Operation (Coprocessor Configuration) Features of Numeric Processor 8087. **[No. of Hrs.:11]**

UNIT – IV

Memory Interfacing: Types of Memory, RAM and ROM Interfacing with Timing Considerations, DRAM Interfacing, Trouble Shooting of Memory Module.
Advanced Microprocessors and Microcontrollers. **[No. of Hrs.:11]**

TEXT BOOKS:

1. The 8051 Micro controller , Kenneth J.AYALA/ Penram International Publishing, 1996.
2. Microprocessors Interfacing, Hall D.V. , TMH (2^{nd} Edition).

REFERENCE BOOKS:

1. Microprocessor Principle & application , Gilmore PHI 2^{nd} edition 2000.
2. Microprocessor ,Raffiquazzaman, PHI,2000.

Paper Code: ETIC – 304	**L**	**T**	**C**
Paper Power Electronics	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Power Converter Components: Power Transistor and Triac, Commutation, Thyristor, Power MOSFET, IGBT, Thyristor characteristics, Rating, Protection and cooling of Thyristors, Gate circuit requirements, Single pulse and carrier frequency gating. Firing circuits based on RC, UJT, 555 and comparator circuits, Darlington and series parallel combination of Thyristors, GTO & MOSFET Basics. **[No. of Hrs.: 11]**

UNIT – II

Controlled Rectifiers: Cycloconveters and ac controllers, Half wave rectifier, Analysis of single phase controlled rectifiers with different types of loads, effect of transformer leakage inductance. Three phase Converters and line commutated inverters, Single and three phase converters with interphase reactors. Dual converters. Regulated D.C. power supplies using thyristors and Triacs.

[No. of Hrs.: 11]

UNIT – III

Inverters: Principle of inverters, half and full bridge single phase inverters, analysis with resistance and inductive loads, feedback diodes, Three phase inverters, MC-Murray-Bedford half bridge inverters, PWM inverters. **[No. of Hrs.: 11]**

UNIT – IV

Choppers: Principle of choppers, analysis of chopper circuits, Multiquadrant choppers, parallel voltage and current commutated choppers. Solid state speed control of Motors: Converter and chopper control of dc motors, control of universal motor with half wave converter and ac controller, AC motor speed control. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Power Electronics Circuits Devices & Applications ,M. H. Rashid PHI,1999
2. Power Electronics ,P.S Bimbhra ,Khanna Publication 2001 .

REFERENCE BOOKS:

1. Industrial & Power Electronics, G.K Mithal & Gupta, Khanna Publication 2003.
2. Power Electronics, Singh & Kanchandhari, TMH , 1999.

Paper Code: ETIC – 306	**L**	**T**	**C**
Paper Process Control	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction: Control objectives, operating conditions, benefits and importance of Control Engineering. Feedback Control: Introduction, Process and Instruments, Elements of Feedback loop, Tuning of PID controller. **[No. of Hrs.: 11]**

UNIT – II

Cascade Control: Cascade Design criteria, Cascade performance. Feed Forwards Control: Design criteria, FFC performance, Controller algorithm and tuning, Sequential control concept: Batch operation & general structure. **[No. of Hrs.: 11]**

UNIT – III

Adaptive Control System For Non Linear Process: analysis, improvement through Deterministic control loop calculation through final element selection. Multivariable Control: Modeling and transfer function, control performance through loop tuning and decoupling. **[No. of Hrs.: 11]**

UNIT – IV

Centralized Multi Variable Control: Multivariable model, Predictive control, Simple and multivariable dynamic matrix control loop. Process Control Design: Definition and decisions, measurement, final elements, process operability, control structure, control algorithm, control for safety, control monitoring. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Process Control, Thomas E. Marlin , Mc Graw Hill, 2nd Edition
2. Chemical Process Control, G. Stephanopulous,PHI, 1997.

REFERENCE BOOKS:

1. Instrumentation Engineers Handbook,B.G Liptak, BH Publication,1999
2. Computer based industrial control ,K. Kant , PHI ,2004

Paper Code – ETIT - 308 **L T C**
Paper : Digital Signal Processing **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Discrete time signals and systems, Z-transforms, structures for digital filters, design procedures for FIR and IIR filters. Frequency transformations: linear phase design; DFT. Methods for computing FFT. Noise analysis of digital filters, power spectrum estimation.

Signals and signal Processing: characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signals Processing applications.

Time Domain Representation of Signals & Systems: Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI Discrete-Time systems, state-space representation of LTI Discrete-Time systems, random signals. **[No. of Hrs.: 11]**

UNIT – II

Transform-Domain Representation of Signals: the Discrete-Time Fourier Transform, Discrete Fourier Transform, DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse z-transform, properties of z-transform, transform domain representations of random signals, FFT Algorithms.

[No. of Hrs.: 11]

UNIT – III

Transform-Domain Representation of LTI Systems: the frequency response, the transfer function, types of transfer function, minimum-phase and maximum-Phase transfer functions, complementary transfer functions, Discrete-Time processing of random signals.

Digital Processing of Continuous-Time Signals : sampling of Continuous Signals, Analog Filter Design, Anti-aliasing Filter Design, Sample-and-hold circuits, A/D & D/A converter, Reconstruction Filter Design. **[No. of Hrs.: 11]**

UNIT – IV

Digital Filter Structure: Block Diagram representation, Signal Flow Graph Representation, Equivalent Structures, FIR Digital Filter Structures, IIR Filter Structures, Parallel all pass realization of IIR transfer function, Digital Sine-Cosine generator.

Digital Filter Design: Impulse invariance method of IIR filter design, Bilinear Transform method of IIR Filter Design, Design of Digital IIR notch filters, FIR filter Design based on truncated fonner sens, FIR filter design based on Frequency Sampling approach.

Applications of DSP. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Sanjit K. Mitra, “DSP a Computer based approach” , TMH, 2nd Ed., 2001.
2. Allan Y. Oppenhein & Ronald W. Schater , "Digital Signal Processing”, PHI, 2004.

REFERENCE BOOKS:

1. J. R. Jhohnson, “Intorduction to Digital Signal Processing”, PHI, 2000.
2. B. Somanthan Nair, “Digital Signal Processing: Theory, Analysis & Digital Filter Design”, PHI, 2004

Paper Code: ETMS – 310	**L**	**T**	**C**
Paper Industrial Economics & Management	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction: Nature and significance of Economics. Meaning of Science, Engineering and Technology and their relationship with economic development. **[No. of Hrs.: 11]**

UNIT – II

Basic Concept: the concept of demand and supply, Elasticity of Demand and Supply. Indifference Curve Analysis, Price Effect, Income Effect and Substitution Effect.

[No. of Hrs.: 11]

UNIT – III

Money and Banking: Functions of Money, Value of Money, Inflation and measures to control it. Brief idea of functions of banking system, viz. Commercial and central banking, Business fluctuations. **[No. of Hrs.: 11]**

UNIT - IV

Introduction: Definition, Nature and Significance of Management, Evaluation of Management thought, Contributions of Max Weber, Taylor and Fayol.Human Behaviour: Factors of Individual Behavious, Perception, Learning and Personality Development, Interpersonal Relationship and Group Behaviour. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Modern Economic Theory , Deweti, K. K. S. Chand
2. Principles of Management., Prasad L. MR
4. John M. Ivancevich, T. N. Duening, "Business & Management: Principles and Guidelines", biztantra, Dreamtech, 2005.

REFERENCE BOOKS:

1. A Text Book of Economic theory , A. W. Stonier & D. C. / Horgne / Oxford Publishing House Pvt. Ltd.

Code No.: ETIC 312	**L**	**T**	**C**
Paper: Electrical Drives and Control	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Introduction: Solid state controlled electric drive-Concept, elements and salient features, power converter motor system, closed loop control of electric drives, sensing of speed and current, review of power converter circuits, performance parameters.

Permanent Magnet Machines: Unique features of PM Machines, Permanent magnet materials, Power limitations of PM machines, Permanent magnet d.c. machines, Permanent Magnet synchronous Machines, Applications of Permanent magnet machines. **[No. of Hrs. 11]**

UNIT - II

Control of D. C. Drives: Control of d.c. separately and series excited motor drives using controlled converters (single phase and three phase) and choppers, static Ward-Leonard, control scheme, power factor improvement, solid state electric braking scheme, closed loop control schemes. **[No. of Hrs. 11]**

UNIT – III

Control of A. C. Motor Drives: Control of three phase induction motor drive using a.c. voltage controllers, cyclo converters. Voltage source and current source inverters; concept of field oriented control, slip power controlled slip ring induction motor drives, closed loop control schemes, self controlled synchronous motor drives, brushless dc motor drive, switched reluctance motor drive. **[No. of Hrs. 11]**

UNIT - IV

Microprocessor Control of Electric Drive: Functions of microprocessor in electric drive control, salient features of microprocessor control, microprocessor based control schemes for d.c. induction and synchronous motor drives, applications. **[No. of Hrs. 11]**

TEXT BOOKS:

1. G. K. Dubey, "Power Semiconductor controlled Drives", Narosa Publications, 1999
2. J. M. D./ Mruphy & I. G. Turnbull, "Power Electronic Control of a.c. motors", Pergamon Press.

REFERENCE BOOKS:

1. B. K. Bose, "Power Electronics and ac Drives", Peasrson, 2002
2. S. B. Dewan & G. R. Stemon & A. Straughen, "Power semiconductor Drives", Wiley Inter Science
3. V. Subrahmanyam, "Thyristor Control of Electric Motors", Tata McGraw Hill
4. P. C. Sen, "Thyristor dc Drives", Wiley International
5. S. A. Nasar: Electric Machines and Power Systems.

Code No. : ETEE 352	**L**	**P**	**C**
Paper: Microprocessor System - II Lab.	**0**	**2**	**1**

Practical will be based on Microprocessor System - II.

Code No. : ETIC 354	**L**	**P**	**C**
Paper: Power Electronics Lab.	**0**	**2**	**1**

Practical will be based on Power Electronics.

Code No. : ETIT 356	**L**	**P**	**C**
Paper: Digital Signal Processing Lab.	**0**	**2**	**1**

Practical will be based on Digital Signal Processing.

Code No. : ETIC 358	**L**	**P**	**C**
Paper: Process Control Lab.	**0**	**2**	**1**

Practical will be based on Process Control.

Paper Code: ETIC – 401	**L**	**T**	**C**
Paper Microcontroller	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

8048 Microcontroller: 8048, 8049 functional overview, 8048 series microcomputer pins & signals, 8048 series timing and instruction execution, Internal & external Interrupts, 8048 microcomputer series instruction set **[No. of Hrs.: 11]**

UNIT – II

8051 Microcontroller: 8051 Internal Architecture, I/O configuration, serial interface, interrupts, Power saving modes of operation, Addressing modes, Instruction set. **[No. of Hrs.: 11]**

UNIT - III

Assemble Language Programming with Microcontroller: Assembly Language Programming, Saving CPU status during interrupts, Passing Parameter on the stack, N way branching, computing branch destination, at run time, In line code parameter passing. **[No. of Hrs.: 11]**

UNIT – IV

Peripheral Interface Techniques: I/O configuration, 8253 interfacing, Software delay timing, Serial port & timer configurations, simple I/O driver, Transmitting serial port character strings. Introduction to Intel 8096, MC 68H 11 Microcontrollers, Introduction to PLC's

[No. of Hrs.: 11]

TEXT BOOKS:

1. The 8051 Microcontroller, Kenneth J. Ayala / Penram International Publishing, 1996
2. Programming and Customizing 8051 microcontroller ,Myke Predko,TMH 1999

REFERENCE BOOKS:

1. Microcontroller Intel Handbook
2. Microcontroller A. Mazdi / TMH

Paper Code – ETIC - 403 **L T C**
Paper: Biomedical & Analytical Instrumentation **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction to Biomedical Instrumentation: Biometrics, development of Biomedical Instrumentation, problems encountered in Bio-medical measurements, sources of Bio-electric potential, active and resting potentials.

Basic Bio-Medical Transducer Principles: The transduction in active and passive transducers, applications in bio-medical instrumentation, Bio-potential electrodes and Bio-chemical transducers. **[No. of Hrs.: 11]**

UNIT – II

Bioelectric Potential Recorders: Introduction and analysis of ECG, EMG & EEG, construction and working principles, pace makers and defibrillators.

Biomedical Measurements: Measurement of blood pressure, direct-indirect methods, heart rate, respiration rate and pulse rate measurements, body temperature measurements, ultrasonic blood flow meters, electromagnetic blood flow measurements. **[No. of Hrs.: 11]**

UNIT – III

Patient Monitoring System: Besides and Central patient monitoring systems, elements of I.C. monitoring, Instrumentation for patient monitoring.

Mass Spectrometer: Introduction, components of mass spectrometers, Resolution, types of mass spectrometers.

Gas Chromatography: Theory of gas chromatography, working of gas chromatography, gas-solid chromatography. **[No. of Hrs.: 11]**

UNIT – IV

Analytical Instrumentation: Introduction Types of analytical methods, instrumentation analysis, Introduction to absorption, spectroscopic, UV, Visible spectra photometery, Infrared spectrometer. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Medical instrumentation application and design,John G. Webster,John wiley,1998
2. Review of medical physiology, W.F. ganong , Medical publisher, 1977
3. Biomedical instrument and measurement, Cromwell,PHI, 2000

REFERENCE BOOKS:

1. Handbook of biomedical instrument, khandpur, TMH

Paper Code – ETEE - 405 **L T C**
Paper Computer Networks **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Uses of Computer Networks, Network Architecture, Reference Model (ISO-OSI, TCP/IP-Overview, IP Address Classes, Subneting), Domain Name Registration & Registrars

The Physical Layer: Theoretical basis for data communication, transmission media-Magnetic Media, Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable, Fibre Cable, Structured Cabling, Cable Mounting, Cable Testing, Wireless transmission, the telephone system, narrowband ISDN, broadband ISDN and ATM. **[No. of Hrs.: 11]**

UNIT – II

The Data Link Layer: Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, Examples of Data Link Protocols. **[No. of Hrs.: 11]**

UNIT - III

The Medium Access Sublayer: The channel allocation problem, multiple access protocols, IEEE standard 802 for LANS and MANS, high-speed LANs, satellite networks, Network devices-repeaters, hubs, switches and bridges. **[No. of Hrs.: 11]**

UNIT – IV

The Network Layer: Network layer design issues, routing algorithms, congestion control algorithm, internetworking, the network layer in the internet, the network layer in ATM networks. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. A. S. Tananbaum, "Computer Networks", 3rd Ed, PHI, 1999.

REFERENCE BOOKS:

1. U. Black, "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
2. W. Stallings, "Computer Communication Networks", PHI, 1999.
3. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.
4. Michael A. Miller, "Data & Network Communications", Vikas Publication, 1998.
5. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication, 1999.

Paper Code – ETIC - 409 **L T C**
Paper: Instrumentation Diagnostics **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction to fault model & fault simulation. Fault location & Board level testing, Test generation for combinational circuits. D – Algorithm & its improvement. **[No. of Hrs.: 11]**

UNIT – II

Introduction. Maintenance Concepts, Maintenance Strategies – Corrective, Preventive and predictive maintenance **[No. of Hrs.: 11]**

UNIT – III

Condition Monitoring Techniques & Signature Analysis Applications – Vibration Monitoring, Oil Analysis, Temperature and current. Monitoring, Performance Monitoring and Non – destructive Techniques. Maintenance Planning. Maintenance Documentation.

[No. of Hrs.: 11]

UNIT – IV

Training and Safety Aspects in Maintenance. Filtration and Contamination Control, Introduction to residual life assessment studies. **[No. of Hrs.: 11]**

TEXT BOOK:

1. Instrumentation Measurement & Analysis., B C Nakra, K K Chaudhry,PHI,2003
2. Mechenical Fault Diagnosis and condition Monitoring,R.A.colacott,John Wiley & sons,1997

REFERENCE BOOKS:

1. Handbook of condition monitoring,B.K.N. Rao,Ne

Paper Code – ETIC – 411 **L T C**

Paper Computerized Process Control **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - 1

An Overview Introduction to Computer Control system: Functional block diagram. Data Acquisition Systems. Supervisory Control and control digital control (DDC) and their working.

Introduction to SCADA System Architecture Significance and its application in industry. Introduction to Virtual Instrumentation: graphical programming data flow & Advantages of VI techniques, VIS & Virub VIS loops & charts , arrays **[No. of Hrs.: 11]**

UNIT - II

Distributed Digital Control Systems: Architecture of DCS, Various displays, DCS element, Introduction to DCS cards, DCS system integration with PLC and PC, Overview of typical Data Honeywell TDC- 3000 DCS, Communication links and overview of protocols (TCP/IP, FIB, MODBUS) **[No. of Hrs.: 11]**

UNIT – III

Case study of Steel Plant, Sugar Plant , cement plant **[No. of Hrs.: 11]**

UNIT - IV

PC hardware Review & Instrumentation bases:- ISA, PCI, IEEE 488, Serial Intricacy RS232 RS45, Introduction to Intelligent Instrumentation **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Lab view graphical programming , Gary John Son ,II Edition ,MagrawHill ,1977.
2. PC interface For Data Acquiring & Process Control, S. Gupta, JP Gupta 2nd Ed./Instrument Society of America 1994.

REFERNCE BOOKS:

1. Liptak, B. G. (E.d.), "Instrument Engineers Handbook", vol. I to III, M. C. Graw Hill

Paper Code – ETIC - 413 **L T C**
Paper Database Management System **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction : Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.

DBMS models: Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model **[No. of Hrs.: 11]**

UNIT – II

Hierarchical model: Concepts, Data definition, Data manipulation and implementation. Relation Model: Relational database, Relational Algebra, Relational Calculus

[No. of Hrs.: 11]

UNIT - III

Network Model: Network Data Model, DBTG Set Constructs, and Implementation. Relational Database Design and Query Language: SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency. **[No. of Hrs.: 11]**

UNIT - IV

Concurrency Control: Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery.

New Applications: Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. C. J. Date, "An Introduction to Data Base Systems" Pearson Education, 2001
2. Silberschate, Korth, Sudarshan, "Database System Concepts" Mc. Graw Hill, 4th Edition

REFERENCE BOOKS:

1. Desai, "An Introduction to Database Systems" Galgotia, 2003.
2. Navathe, "Fundamentals of Database Systems" Pearson Education, 3rd Edition.

Paper Code – ETEE - 415 **L T C**

Paper Software Engineering **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS. **[No. of Hrs.: 11]**

UNIT – II

Software Project Planning: Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, COCOMO-II, Putnam resource allocation model, Risk Management.

Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design **[No. of Hrs.: 11]**

UNIT - III

Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics

Software Reliability: Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models, Basic Model, Logarithmic Poisson Model, Software Quality Models, CMM & ISO 9001. **[No. of Hrs.: 11]**

UNIT - IV

Software Testing: Testing process, Design of test cases, functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Path Testing, Data flow and mutation testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing, Testing Tools & Standards.

Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International, 2005.
2. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

REFERENCE BOOKS:

1. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, TMH, 1996.
2. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons, 2004.
3. I. Sommerville, "Software Engineering", Addison Wesley, 2004
4. K. Chandrasehakhar, "Software Engineering & Quality Assurance", BPB, 2005.

Paper Code – ETIC - 417 **L T C**

Paper Process Modeling & Optimization Techniques **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - 1

Classification of models, major activity in model bonding, use of mathematical models, scope of coverage, principles of formulation.

Fundamental Laws: Continuity equations, energy equations, of Motions, Transport equations, Equations of state equilibrium, Chemical kinetics **[No. of Hrs.: 11]**

UNIT - II

Solving the mathematical models for dynamic systems heat transfer system, tanks types reactor systems, vaporizer, flashdrum, batch reactors, continuous distillation in multi-tray columns, dynamic modeling loop. **[No. of Hrs.: 11]**

UNIT - III

Process Identification: Purpose, Time domain "Eyeball" fitting of step test data, direct sine, pulse, and step signal testing. ATV identification. **[No. of Hrs.: 11]**

UNIT - IV

The nature & organization of optimization problems, formulation of objective function, cost, time.

Value of money, measure of probability, methods of least squares.

Single & multivariable optimization, linear programming and simplex method, sequential quadrate programming & reduced gradient optimization technique. Introduction to geometric programming & dynamic programming. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Process Modeling & Simulation Control for Chemical Engineers by W. L. Luben, McGraw Hill. 1995
2. Applied instrumentation in the process industries, vol 1,2,3,W.G. Andrews and Williams, Gulf publishing company 2002

REFERNCE BOOKS:

1. Process Instrumentation Manifolds, Instrumentation society of America.,

Code No. : ETIC 451	**L**	**P**	**C**
Paper: Micro Controller Lab.	**0**	**2**	**1**

Practical will be based on Micro Controller.

Code No. : ETIC 453	**L**	**P**	**C**
Paper: Biomedical Lab.	**0**	**2**	**1**

Practical will be based on Biomedical.

Code No. : ETIC 455	**L**	**P**	**C**
Paper: #^Practical Training	**0**	**0**	**1**

#NUES
^Practical training conducted after sixth semester will be evaluated in the Seventh Semester based on Viva-Voce.

Code No. : ETIC 457	**L**	**P**	**C**
Paper: Minor Project	**0**	**8**	**4**

Students may choose a project based on any subject of Electrical & Electronics Engineering. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

Code No. : ETIC 459	**L**	**P**	**C**
Paper: #Seminar	**0**	**2**	**1**

#NUES
A college committee will evaluate the performance of the students & marks will be awarded accordingly.

Paper Code: ETIC – 402	**L**	**T**	**C**
Paper: Soft Computing	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks. **[No. of Hrs.: 11]**

UNIT - II

Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. **[No. of Hrs.: 11]**

UNIT – III

Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets. **[No. of Hrs.: 11]**

UNIT - IV

Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks.

Application of Fuzzy Logic: Medicine, Economics etc.

Genetic Algorithm: An Overview, GA in problem solving, Implementation of GA

[No. of Hrs.: 11]

TEXT BOOKS:

1. AI & Expert system, Janki Raman ,MacMillen,2003

2. Artificial Intelligence, Knight ,TMH,1991.

3. Artificial Intelligence, G.F luger,Pearson education,2003

REFERENCE BOOKS;

1. Artificial Intelligence, Patricks henry ,Winston,Pearson education,2001

2. Artificial Intelligence, Nilsson , Morgon, Kufmann 1998.

Paper Code: ETIC – 404	**L**	**T**	**C**
Paper: Robotics	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction : Robotics concept and problems , Co-ordinates and co-ordinate inversion, Trajectory P planning , some system concepts. Clocks, sensors , Actuators and control , Signal processing Generation of Robots Kinematics : Introduction , reference frames, rotation matrix , Rigid body , Motion , Angular velocity of rigid body , moving , motion relative4 to moving reference frames , Homogenous frames Homogenous co- ordinates. **[No. of Hrs.: 11]**

UNIT - II

Euler's Laws: Introduction , Theorems and facts about moment , Euler's law of motion
Sensors and Instrumentation: Used sensors , the piezoelectric Accelerometer hall effect sensors.
Optical encoders , Tactile & force sensors. **[No. of Hrs.: 11]**

UNIT - III

Image Identification : Lenses , Vidicon tube , solid state vision systems, image processing binary image analysis identification , the transformation. **[No. of Hrs.: 11]**

UNIT - IV

Actuators and Power Transmission Devices: Pneumatic and hydraulic Actuators. Electrical Actuators, power transmission Trajectory Planning & control: Manipulator Equations of motion manipulator control, the measure of the Robot **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Robotics Control Sensing , Vision and Intelligence, K.S.Fu / ./ McGraw Hill, ist Edition
2. Introduction to Robotics ,J.Craig, Addison Wesley

REFERENCE BOOKS:

1. Analytical Robotics and Mechatronics , WolframStadler , McGraw Hill

Paper Code: ETEC – 406	**L**	**T**	**C**
Paper: Consumer Electronics	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Audio System : Hi-Fi systems, stereophonic sound system , public address systems, Acoustics Quadraphonic sound systems, Graphics Equalizer, speed Synthesizer, Electronic tuning.

[No. of Hrs.: 11]

UNIT - II

Video Systems : B& W TV , color TV and HD TV systems , Electric cameras, VCR , VCP , CD systems , Memory diskettes , Discs and drums vide monitoring audio , video Recording media and systems **[No. of Hrs.: 11]**

UNIT - III

Dolby noise reduction digital and analog recording. Switching Systems: Switching systems for telephone exchange , PAB EPABX , modular telephones, Telephone massage recording concepts, remix controlled systems. **[No. of Hrs.: 11]**

UNIT - IV

Home Appliances : Electronics toys , microwave oven , Refrigerators , washing machines, calculators, data organizers. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. R.R.Gulati / Monochrome and color television / New age publisher
2. Encyclopedia of video & TV /Focal press.

REFERENCE BOOKS:

1. Handbook of Electronics & Telecommunication.

Paper Code: ETIT – 408	**L**	**T**	**C**
Paper: Embedded System	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction to an embedded systems design & RTOS: Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.

Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks. **[No. of Hrs.: 11]**

UNIT – II

Overview of Microcontroller: Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming

[No. of Hrs.: 11]

UNIT – III

Communication with 8051: Basics of Communication, Overview of RS-232, I^2C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Programming of External hardware interrupts, Programming of the serial communication interrupts, Interrupt priority in the 8051 **[No. of Hrs.: 11]**

UNIT - IV

Interfacing with 8051: Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard, Interfacing a DAC to the 8051, 8255 Interfacing with 8031/51, 8051/31 interfacing to external memory

[No. of Hrs.: 11]

TEXT BOOKS:

1. Raj Kamal, "Embedded Systems", TMH, 2004.
2. M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2004.

REFERENCES BOOKS:

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
2. K.J. Ayala, "The 8051 Microcontroller", Penram International, 1991.
3. Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
4. Dr. Prasad, "Embedded Real Time System", Wiley Dreamtech, 2004.

Paper Code: ETEE – 410 **L T C**
Paper: Object Oriented Software Engineering **3 1 4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Introduction to Software Engineering: Software Engineering Development, Software Life Cycle Models, Comparison of various models

Requirement Elicitation: Introduction to Object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model-Action & Use cases, Requirements Elicitation Activities, Managing Requirements Elicitation. **[No. of Hrs.: 11]**

UNIT – II

Architecture: Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model

Analysis: Introduction, the requirements model, the analysis model

[No. of Hrs.: 11]

UNIT – III

Construction: Introduction, the design model, block design, working with construction

Testing: introduction, on testing, unit testing, integration testing, system testing, the testing process **[No. of Hrs.: 11]**

UNIT – IV

Modelling with UML: Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams.

Case Studies **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Ivar Jacobson, "Object Oriented Software Engineering", Pearson, 2004.
2. Grady Booch, James Runbaugh, Ivar Jacobson, "The UML User Guide", Pearson, 2004.
3. Wendy Boggs,Boggs,Michael Boggs "Mastering UML with Rational Rose", BPB Publication, 2003.

REFERENCES BOOKS:

1. Stephen R. Scach, "Classical & Object Oriented Software Engineering with UML and Java: McGraw Hill, 1999.
2. Richard C. Lee, William M. Tepfenhard, "UML and C++, A Practical guide to object-oriented Development", Pearson Education, 2002.

Paper Code: ETEC – 412	**L**	**T**	**C**
Paper: Digital Image Processing	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT - I

Introduction and digital image fundamentals : Digital image Representation , Fundamental steps in image processing ,elements of digital image processing systems , sampling and quantization , some basic relationship like neighbors , connectivity , Distance measure between pixels . Imaging Geometry Image Transforms: Discrete Fourier Transform , some properties of the two-dimensional Fourier transform , fast Fourier transform, Inverse FFT **[No. of Hrs.: 11]**

UNIT - II

Image Enhancement : Spatial domain methods, frequency domain methods , Enhancement by point processing , spatial filtering .low[pass filtering , High pass filtering Homomorphic filtering, Colour image processing **[No. of Hrs.: 11]**

UNIT - III

Image Restoration : Degradation model, Diagnolization of Circulant and block- Circulant Matrices , Algebraic Approach to restoration , Inverse filtering , Wiener filter , Constrained least square Restoration , Interactive Restoration , Restoration in spatial Domain. Image Compression: Coding , Interpixel and psycho visual Redundancy , Image compression models error free comparison , lossy compression , Image compression standards . **[No. of Hrs.: 11]**

UNIT - IV

Image segmentation: Detection of Discontinuities Edge linking and boundary detection Thresholding , region oriented segmentation ,motion based segmentation.

Representation and Description : Representation schemes like chain coding , polygonal Approximation , signatures , boundary segments , skeleton of region , boundary description , regional descriptors , Morphology . Recognition and Interpretation : Elements of image analysis , pattern classes , Decision theoretic methods , structural methods, interpretation

[No. of Hrs.: 11]

TEXT BOOKS:

1. Digital image processing, Rafael C. Gonzalez & R.E . Woods,Pearson ,5th edition 2005
2. Digital Image Processing, A.K. Jain ,PHI, 2004
3. Digital Image Processing, Chanda & Majumdar ,PHI,2002

REFERENCE BOOKS:

1. Digital Image Processing ,Nick efford,Pearson education 2004.
2. Digital Image Processing , Kenneth R. Castlema

Paper Code: ETEE – 414	**L**	**T**	**C**
Paper: Advanced Computer Networks	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:	**MAXIMUM MARKS: 75**
1.	Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2.	Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

UNIT – I

Review of Physical & Data link layer, ISDN, Frame Relay, ATM **[No. of Hrs.: 11]**

UNIT – II

Network Layer: ARP and RARP, Routing algorithms and protocols, Congestion control algorithm, Router Operation, Router configuration, Internetworking, IP Protocol, IPv6 (an overview). **[No. of Hrs.: 11]**

UNIT – III

Transport Layer: UDP, TCP (Flow Control, Error Control, Connection Establishment)

[No. of Hrs.: 11]

UNIT – IV

Application layer: DNS, SNMP, RMON, Electronic Mail, WWW.

Network Security: Firewalls (Application and packet filtering), Cryptography, Virtual Print,

[No. of Hrs.: 11]

TEXT BOOKS:

1. B. A. Forouzan, "TCP/IP Protocol Suite", TMH, 2nd Ed., 2004.

REFERENCE BOOKS:

1. U. Black, "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
2. W. Stallings, "Computer Communication Networks", PHI, 1999.
3 W. Stallings, "SNMP, SNMPv2, SNMPv3, RMON 1&2", 3rd Ed., Addison Wesley, 1999.
4. Michael A. Miller, "Data & Network Communications", Vikas Publication, 1996.
5. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication, 1999.
6. A. S. Tananbaum, "Computer Networks", 3rd Ed, PHI, 1999.
7. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.

Code No. : ETIC 452	**L**	**P**	**C**
Paper: Soft Computing Lab.	**0**	**2**	**1**

Practical will be based on Soft Computing.

Code No. : ETIC 454	**L**	**P**	**C**
Paper: Robotics Lab.	**0**	**2**	**1**

Practical will be based on Robotics

Code No. : ETIC 456	**L**	**P**	**C**
Paper: Electives	**0**	**2**	**1**

Practical will be based on Electives

Code No. : ETIC 458	**L**	**P**	**C**
Paper: Major Project	**0**	**12**	**7**

Students may choose a project based on any subject of Electrical & Electronics Engineering. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.