

SCHEME OF EXAMINATION

And

SYLLABI

For

BACHELOR OF VOCATION

In

(MOBILE COMMUNICATION)

**BRIDGE COURSE
LEVEL IV SKILL COMPONENT**

And

1st SEMESTER to 2nd SEMESTER

Offered by

University School of Engineering and Technology



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

**Guru Gobind Singh Indraprastha University
Sector 16-C, Dwarka, Delhi – 110078 [INDIA]**

www.ipu.ac.in

NOMENCLATURE OF CODES GIVEN IN THE SCHEME OF B.VOC

1. **ET** stands for Engineering and Technology.
2. **AP** stands for Architecture and Planning
3. **V** stands for Vocation.
4. **MC** stands for Mobile Communication.
5. **SD** stands for Software Development.
6. **AE** stands for Automobile.
7. **CE** stands for Consumer Electronics.
8. **PT** stands for Printing Technology.
9. **CT** stands for Construction Technology.
10. **RA** stands for Refrigeration & Air-Conditioning.
11. **PD** stands for Power Distribution Management.
12. **ID** stands for Interior Design.
13. **AA** stands for Applied Arts.
14. **CS** stands for Computer Science.
15. **MS** stands for Management Studies.
16. **EN** stands for Environmental Engineering
17. **PH** stands for Physics
18. **AS** stands for Applied Science.
19. **HS** stands for Humanities and Social Sciences.
20. **SS** stands for Social Services.
21. **L/T** stands for Lecture and Tutorial
22. **P** stands for Practical.
23. **S/D** stands for Drawing/Studio
24. **P/D** stands for Practical/Drawing



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

TITLE OF THE PROGRAMME
BACHELOR OF VOCATION IN MOBILE COMMUNICATION

Preamble:

This B. Voc. Course has been incorporated with the twin objective of aligning the higher education with the emerging needs of the economy so as to ensure that the graduates of higher education system have adequate knowledge and skills for employment and entrepreneurship and provide an opportunity of vertical mobility to the students passing from ITIs and 10+2 vocational streams in the field of telecom/ mobile communication.

This Course is based on CBCS (Choice Based Credit System) of UGC (University Grants Commission) leading to Bachelor of Vocation (B. Voc.) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF (National Skill Qualification Framework).

Under the National Skills Development Corporation, Telecom Sector Skill Council representing respective industries has been established. TSSC has developed National Occupational Standards (NOSs) for various job roles in mobile communication/ telecom industries. The requirements of telecom industries have been given precedence while designing the curriculum, in an innovative and flexible manner while developing a holistic and well groomed graduate.

Objectives:

- To provide judicious mix of skills relating to mobile communication and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within curriculum in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- To provide vertical mobility to students coming out of 10+2 (PCM)/ ITI in relevant field.

Programme Structure

This Course is based on CBCS (Choice Based Credit System) of UGC (University Grants Commission) leading to B. Voc.(Mobile Communication) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF (National Skill Qualification Framework). The course structure is given in table 1.

Table I: Programme Structure for B. Voc. (Mobile Communication)

NSQF Level	Skill Component Credits	General Education Credits	Normal Calendar Duration	Exit Points/ Awards
7	52	12	Six Semesters/ 3 years	Degree in B.Voc. (Mobile Communication)
6	51	12	Four Semesters/ 2 years	Advanced Diploma (Mobile Communication)
5	50	13	Two Semesters/ 1 years	Diploma (Mobile Communication)
TOTAL	153	37		

Programme Outcome:

The certification levels will lead to Diploma/Advanced Diploma/B. Voc. Degree in Mobile Communication and will be offered under the aegis of the GGSIP University. This is out-lined in Table II.

Table II: Programme outcomes after each year

Award	Duration		Corresponding NSQF	Job Profile: Skill set Acquired
Diploma (Mobile Communication)	1	Year	5	Maintenance Engineer: BTS site; Customer Care Executive; Mobile Repair Engineer.
Advanced Diploma (Mobile Communication)	2	Years	6	Installation and commissioning of BTS/BSC/MS
B. Voc. Degree (Mobile Communication)	3	Years	7	Supervisor for above job roles; RF Planner/ Telecom Service Manager Android App Developer;

Students will be awarded of Diploma:

1. Student shall be required to appear in examinations of all courses. However, to award the Diploma (Mobile Communication) a student shall be required to earn a minimum of **60 credits**.

Students will be awarded of Advanced Diploma:

1. Student shall be required to appear in examinations of all courses. However, to award the Advanced Diploma (Mobile Communication) a student shall be required to earn a minimum of **120 credits**.

Students will be awarded of B.Voc Degree:

1. Student shall be required to appear in examinations of all courses. However, to award the degree a student shall be required to earn a minimum of **180 credits**.

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**BACHELOR OF VOCATION
BRIDGE COURSE FOR (10+2)/10+ITI STUDENTS
(FOR ALL ENGINEERING DISCIPLINES)
(FIRST SEMESTER EXAMINATION)
(LEVEL-IV)**

Paper Code	Paper ID	Paper	L/T/P	Credits
ETVMC-401		Module-I*	6	6
ETVMC-403		Module-II*	6	6
TOTAL			12	12

No. of Hours: 12 x 15 Hours =180 Hours

**BACHELOR OF VOCATION
BRIDGE COURSE FOR (10+2)/10+ITI STUDENTS
(FOR ALL ENGINEERING DISCIPLINES)
(SECOND SEMESTER EXAMINATION)
(LEVEL-IV)**

Paper Code	Paper ID	Paper	L/T/P	Credits
ETVMC-402		Module-III*	6	6
ETVMC-404		Module-IV*	6	6
TOTAL			12	12

No. of Hours: 12 x 15 Hours =180 Hours

***Non University Examination System (NUES)**

NOTE I:

The institute is advised to teach/provide relevant skills through Module I to IV, which are pre-requisite for first year of B.Voc.

OR

Relevant qualification pack in alignment with NSQF Level IV may be taught by the institute, which is pre-requisite for B.Voc.

NOTE II:

Bridge course is to be taught during first year. Evaluation for bridge course modules will be in Non University Examination System (NUES) pattern. Each module will be of 100 marks.

SCHEME OF EXAMINATION**And****SYLLABI****For****BACHELOR OF VOCATION****In****(MOBILE COMMUNICATION)
1st SEMESTER to 2nd SEMESTER****Offered by****University School of Engineering and Technology****GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY****Guru Gobind Singh Indraprastha University
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**BACHELOR OF VOCATION
(MOBILE COMMUNICATION)
FIRST SEMESTER EXAMINATION
(LEVEL-V)**

Paper Code	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETVMC-501		Basics of Electrical Engineering	3	0	3
ETVMC-503		Analog Electronics	3	0	3
ETVMC-505		Digital Electronics	3	0	3
ETVHS-519		Communication Skills (Common to all disciplines)	2	1	3
OPEN ELECTIVE-I (Select any one)					
ETVAS-511		Aptitude & Logical Reasoning	3	0	3
ETVAS-515		Mathematics Foundation for Electronics	3	0	3
GENERAL ELECTIVE-I (Select any one)					
ETVHS-513		Human Values and Professional Ethics	2	0	2
ETVHS-517		Personality Development & Behavioural Science	2	0	2
PRACTICAL/VIVA VOCE (Select any one Lab based on OPEN ELECTIVE-I)					
ETVAS-555		Aptitude & Logical Reasoning Lab	0	2	2
ETVAS-561		Mathematics Foundation for Electronics Lab	0	2	2
PRACTICAL/VIVA VOCE					
ETVMC-551		Basics of Electrical Engineering Lab	0	3	3
ETVMC-553		Analog Electronics Lab	0	3	3
ETVMC-555		Digital Electronics Lab	0	3	3
ETVMC-557		Vocational Workshop	0	2	2
TOTAL			16	14	30

NOTE:

There are five industrial trainings to be carried out by the student(s) in B.Voc course. Industrial Trainings I, III and V will be with weightage of two credits each. These trainings are to be carried out during winter vacations for the duration of two weeks. Industrial Trainings II and IV will be with weightage of four credits each. These trainings are to be carried out during summer vacations for the duration of four to six weeks. These training may be done from industry/Skill Knowledge Providers (SKPs) /Sector Skill Councils (SSCs) / Training Centers/Institutes. Student should submit training report during evaluation. Industrial Training done at the end of the semester will be evaluated in the subsequent semesters.

**BACHELOR OF VOCATION
(MOBILE COMMUNICATION)
SECOND SEMESTER EXAMINATION
(LEVEL-V)**

Paper Code	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETVSD-506		Programming Skills using C	3	0	3
ETVMC-504		Linear Integrated Circuits.	3	0	3
ETVMC-506		Analog and Digital Communication	3	0	3
ETVEN-502		Environmental Science (Common to all disciplines)	3	0	3
OPEN ELECTIVE-II (Select any one)					
ETVMC-508		Electronics Measurements and Instrumentation	3	0	3
ETVMC-510		Industrial Electronics	3	0	3
PRACTICAL/VIVA VOCE (Select any one Lab based on OPEN ELECTIVE-II)					
ETVMC-558		Electronics Measurements and Instrumentation Lab	0	3	3
ETVMC-560		Industrial Electronics Lab	0	3	3
PRACTICAL/VIVA VOCE					
ETVSD-566		Programming Skills using C Lab	0	3	3
ETVMC-554		Linear Integrated Circuits Lab	0	3	3
ETVMC-556		Analog and Digital Communication Lab	0	3	3
ETVEN-552		Environmental Science Lab / Field work (Common to all disciplines)	0	2	2
ETVMC-562		Project-I	0	6	3
ETVMC-564		Industrial Training-I	0	0	2
TOTAL			15	20	34

NOTE:

There are five industrial trainings to be carried out by the student(s) in B.Voc course. Industrial Trainings I, III and V will be with weightage of two credits each. These trainings are to be carried out during winter vacations for the duration of two weeks. Industrial Trainings II and IV will be with weightage of four credits each. These trainings are to be carried out during summer vacations for the duration of four to six weeks. These training may be done from industry/Skill Knowledge Providers (SKPs) /Sector Skill Councils (SSCs) / Training Centers/Institutes. Student should submit training report during evaluation. Industrial Training done at the end of the semester will be evaluated in the subsequent semesters.

NOTE FOR PROJECT:

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

BASICS OF ELECTRICAL ENGINEERING**Paper Code: ETVMC-501****Paper: Basics of Electrical Engineering**

L	T/P	C
3	0	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.

Objectives and Pre-requisites: The students should have studied Calculus, Matrices, Complex numbers and Electrical concepts from physics. The course aims to provide exposure to basic electrical engineering concepts to non-major students.

Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. An understanding of charge, current, voltage, power, energy, electrical safety, resistors (R), and the fundamental principles of Ohm's law, KVL and KCL, behaviour of inductances (L) and capacitances (C).
2. An ability to write the differential equations for a given RLC network and solve them analytically for the transient and steady state responses to a step input.
3. An ability to qualitatively and quantitatively predict and compute the steady state AC responses of basic circuits using the phasor method.
4. A proficiency in calculating parameters of a two port network.

UNIT-I

Basic Circuit Concepts: Voltage and Current Sources, Resistors: Fixed and Variable resistors, Construction and Characteristics, Color coding of resistors, resistors in series and parallel.

Inductors: Fixed and Variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Inductance in series and parallel, Testing of resistance and inductance using multimeter.

Capacitors: Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor, Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic capacitor, Construction and application, capacitors in series and parallel, factors governing the value of capacitors, testing of capacitors using multimeter.

[T1][T2][No. of Hrs. 11]

UNIT-II

Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis, Mesh Analysis.

DC Transient Analysis: Initially Charged RC Circuit, RL Circuit with Initial Current, Time Constant, RL and RC Circuits With Sources, DC Response of Series RLC Circuits.

[T1][T2][No. of Hrs. 11]

UNIT-III

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor. Sinusoidal Circuit Analysis for RL, RC and RLC Circuits. Mesh Analysis, Node Analysis and Network Theorems for AC Circuits. Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

[T1][T2][No. of Hrs. 11]

UNIT – IV

Network Theorems: Principal of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, and Maximum Power Transfer Theorem.

Two Port Networks: Impedance (Z) Parameters, Admittance (Y) Parameters, Transmission (ABCD) Parameters.

[T1][T2][No. of Hrs. 12]

Text Book(s):

[T1] Hambley, A. R., Electrical Engineering, Principles and Applications, 5th Edition, Prentice Hall, (2011).

[T2] B. L. Theraja, Electrical Technology: Basic Electrical Engineering (Volume-1), S. Chand (2008).

References Book(s):

Scheme and Syllabi for B. Voc. (Mobile Communication), w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub-Committee Meeting of USET/USICT held on 27th July, 2016.

- [R1] S. A. Nasar, Electric Circuits, Schaum's outline series, Tata McGraw Hill (2004).
[R2] Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill.(2005).
[R3] W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill(2005).
[R4] Robert L. Boylestad, Essentials of Circuit Analysis, Pearson Education (2004)
[R5] M. E. Van Valkenburg, Network Analysis, 3rd Edition, PHI Learning (2014).



ANALOG ELECTRONICS**Paper Code: ETVMC-503****Paper: Analog Electronics**

L	T/P	C
3	0	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. should have two questions.

Objectives and Pre-requisites: The objective of teaching this subject is to impart in depth understanding of the concepts of biasing in active circuits and employing simple models to represent nonlinear and active elements in circuits. It also includes the operation of the circuits at high frequencies and effects of feedback. The analysis of power amplifier & tuned amplifiers is also dealt with. The student is expected to have a basic understanding of active and passive circuit elements.

Learning Outcomes: The student is expected to develop a basic knowledge of basic semiconductor devices and their operation in different configurations

UNIT – I

Review of diode and BJT: Review of diode and BJT, CB, CE, CC configurations, comparisons of different configurations, BJT amplifier (CE), dc and ac load line analysis

Bias stabilization: Need for stabilization, fixed Bias, voltage divider bias & β Stabilization factors, thermal stability.

[T1,T2,T3][No. of Hrs: 11]**UNIT – II**

Small signal amplifiers: Quantitative study of the frequency response of a CE amplifier, coupling schemes, RC coupled amplifiers, Emitter follower.

Multistage Amplifiers: Cascade and Cascode amplifiers, Effect on gain and bandwidth for Cascaded CE amplifiers (RC coupled).

Feedback Amplifiers: Concept of feedback, negative and positive feedback, advantages and disadvantages of negative feedback, voltage (series and shunt), current (series and shunt) feedback amplifiers, gain, input and output impedances.

[T1,T2,T3][No. of Hrs: 11]**UNIT – III**

Oscillators: Barkhausen criteria for oscillations, Study of phase shift oscillator, Colpitts oscillator and Hartley oscillator.

MOSFET Circuits: Review of JFET, Depletion and Enhancement MOSFET, Biasing of MOSFETs, Small Signal Parameters, Common Source amplifier circuit analysis, CMOS circuits.

[T1,T2,T3][No. of Hrs: 11]**UNIT – IV**

Power Amplifiers: Power dissipations in transistors, Amplifiers Classification, (Class-A, Class-B, Class-C, Class-AB) Efficiency analysis, Push-pull amplifiers.

Single tuned amplifiers: Circuit diagram, Working and Frequency Response, Limitations of single tuned amplifier, Applications of tuned amplifiers in communication circuits.

[T1,T2,T3][No. of Hrs: 12]**Text Book(s)(s):**

- [T1] Boylestad & Nashelsky, "Electronic Devices & Circuit Theory" PEARSON PUBLICATION
 [T2] Salivahanan, Suresh Kumar, Vallavaraj, "Electronic devices and circuits" TMH, 1999
 [T3] J. Millman and Halkias, "Integrated Electronics, Analog & Digital Circuits & Systems" TMH-2000.

Reference Book(s)(s):

- [R1] N N Bhargava, "Basic Electronics & Linear Circuits", 2nd Ed., TMH.
 [R2] Sedra & Smith, "Micro Electronic Circuits", Oxford University Press, 2000
 [R3] David A Bell, "Electronic Devices and Circuits", Oxford University Press, 2000.
 [R4] Albert Malvino, David J. Bates, "Problems and Solutions in Basic Electronics", TMH.

DIGITAL ELECTRONICS**Paper Code: ETVMC-505****Paper: Digital Electronics**

L	T/P	C
3	0	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 12.5 marks.

Objectives and Pre-requisites: The objective of the paper is to facilitate the student with the knowledge of Logic Systems and Circuits, thereby enabling the student to obtain the platform for studying Digital Systems and Computer Architecture. Knowledge of basic mathematics is sufficient for this course.

Learning Outcomes: The student is expected to develop an understanding of simple digital systems and develop the logic behind the organization of various computer components.

UNIT- I

Number Systems and Codes:- : Decimal, Binary, Hexadecimal and Octal number systems, base conversions, Binary, octal and hexadecimal arithmetic (addition, subtraction by complement methods, multiplication), representation of signed and unsigned numbers, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes.

Logic Gates and Boolean algebra: Truth Tables of OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Basic postulates and fundamental theorems of Boolean algebra.

[T2, T3][No. of Hrs. 11]**UNIT- II**

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Minimization Techniques (K-Map, Boolean Algebra & Quine Mc-Cluskey), Encoder and Decoder, Multiplexers and Demultiplexers, Implementing logic functions with multiplexer & Decoder, binary Adder, binary subtractor, 4 bit adder/ subtractor using 2's complement.

Sequential Logic Circuits: - Latches and Flip Flops- SR, D, T and J.K F.F (Master Slave-JK and Edge Triggered JK Flip Flops), Asynchronous Inputs. Clocked and edge triggered Flip flops.

[T2][T3][No. of Hrs. 11]**UNIT- III**

Synchronous Sequential Circuits:- State Tables, State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations.

Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD/Decade and Up/Down Counters , Ring Counter and Johnson Counter. Shift Registers, Types of Shift Registers (SIPO, PISO, SISO, PIPO), Universal Shift Register.

[T1][T2][No. of Hrs. 11]**UNIT- IV**

Programmable Logic Devices: Brief introduction to RAM and ROM; Basic concepts- ROM, PLA, PAL, FPGA.

Integrated circuits: - TTL and CMOS logic families and their characteristics. Fan-in, Fan out, Noise Margin, Power Dissipation, Propagation delay, Voltage and current levels, Figure of merit and Speed power product.

[T2][T3][No. of Hrs. 12]**Text Book(s):**

- [T1] Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
 [T2] Morris Mano, Digital Logic and Computer Design”, Pearson
 [T3] A Anand Kumar, “Fundamentals of Digital Logic Circuits”, PHI

Reference Book(s):

- [R1] R.P. Jain, “Modern Digital Electronics”, TMH, 2/e.
 [R2] Zyi Kohavi, “Switching & Finite Automata Theory”, TMH, 2 Edition
 [R3] Taub ,Helbert and Schilling, “Digital Integrated Electronics”, TMH
 [R4] W. H. Gothmann, Digital Electronics: An Introduction to Theory And Practice, PHI (2000)

COMMUNICATION SKILLS

Scheme and Syllabi for B. Voc. (Mobile Communication), w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub-Committee Meeting of USET/USICT held on 27th July, 2016.

(Common to All Disciplines)

Paper Code: ETVHS-519
Paper: Communication Skills

L	T/P	C
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.

Objectives and Pre-requisites: Students should have studied General English up to secondary level and the subject aims at developing communication skills in writing, speaking as well as body language.

Learning Outcomes: The students should be able to communicate effectively to his/her superiors as well as juniors at work place in his/her professional field.

UNIT-I

Recognizing and Understanding Communication Styles: What is Communication?, Passive Communication, Aggressive Communication, Passive-Aggressive Communication, Assertive Communication, Verbal and Non Verbal Communication, Barriers and Gateways to Communication.

[T1, T2][No. of Hrs. 11]**UNIT-II**

Listening Skills: Types of Listening (theory /definition), Tips for Effective Listening Academic Listening- (lecturing), Listening to Talks and Presentations, Basics of Telephone communication

Writing Skills: Standard Business letter, Report writing, Email drafting and Etiquettes, Preparing Agenda and writing minutes for meetings, Making notes on Business conversations, Effective use of SMS, Case writing and Documentation.

[T1, T2][No. of Hrs. 11]**UNIT-III**

Soft Skills: Empathy (Understanding of someone else point of view), Intrapersonal skills, Interpersonal skills, Negotiation skills, Cultural Aspects of Communication.

[T1, T2][No. of Hrs. 11]**UNIT-IV**

Group Communication: The Basics of Group Dynamics, Group Interaction and Communication, How to Be Effective in Groups, Handling Miscommunication, Handling Disagreements and Conflicts, Constructive Criticism.

[T1,T2][No. of Hrs. 12]**Text Book(s)(s):**

- [T1] Mckay, M., Davis, M. & Fanning, P.(2008). Messages: The Communication Skills Book(s), New Harbinger Publications
- [T2] Perkins, P.S., & Brown, L. (2008). The Art and Science of Communication: Tools for effective communication in the workplace, John Wiley and Sons

Reference Book(s)(s):

- [R1] Krizan et al (2010). Effective Business Communication, Cengage Learning.
- [R2] Scot, O. (2009). Contemporary Business Communication, Biztantra, New Delhi.
- [R3] Chaney & Martin (2009). Intercultural Business Communication, Pearson Education
- [R4] Penrose et al (2009). Business Communication for Managers, Cengage Learning.

APTITUDE & LOGICAL REASONING
(Open Elective-I)

Paper Code: ETVAS-511
Paper: Aptitude & Logical Reasoning

L	T/P	C
3	0	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 12.5 marks.

***Objectives and Pre-requisites:** At the end of the course the students will be able to (a) Interpret different data, (b) Establish relationship between numbers & (c) Solve different logical. To impart students with logical skills to solve problems easily.*

UNIT-I

Data sufficiency, Measurement, Time and distance, Arithmetic, Relationship between numbers.

[T1][T2][No. of Hrs. 11]

UNIT-II

Basic mathematical relations and formula, Computation, Data interpretation.

[T1][T2][No. of Hrs. 11]

UNIT-III

Differences, Discrimination, Decision-making, Judgement, Problem-solving, Analogies, Analysis.

[T1][T2][No. of Hrs. 11]

UNIT-IV

Arithmetic reasoning, Relationship concept, Arithmetic number series, Similarities, Verbal and figure classification, Space visualization, Observation.

[T1][T2][No. of Hrs. 12]

Text Book(s):

- [T1] Arun Sharma, "How to prepare for Logical Reasoning for the CAT".
[T2] A.K. Gupta, "Logical and Analytical Reasoning".

**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

MATHEMATICS FOUNDATION FOR ELECTRONICS
(Open Elective-I)

Paper Code: ETVAS-515

Paper: Mathematics Foundation for Electronics

L	T/P	C
3	0	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 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Applied Mathematics that are required for an electronics engineering student.

UNIT-I

Matrices I: Orthogonal matrix, Hermitian matrix, Skew-Hermitian matrix and Unitary matrix. Inverse of matrix by Gauss-Jordan Method (without proof). Rank of matrix by echelon and Normal (canonical) form. Linear dependence and linear independence of vectors. Consistency and inconsistency of linear system of homogeneous and non-homogeneous equations.

[T1, T2, R1] [No. of Hrs. 11]

UNIT-II

Matrices II: Eigen values and Eigen vectors. Properties of Eigen values (without proof). Cayley-Hamilton theorem (without proof). Diagonalization of matrix. Quadratic form, reduction of quadratic form to canonical form.

[T1, T2, R1] [No. of Hrs. 11]

UNIT-III

Sequences and series: Sequences, Limit of a sequence, Convergence, Divergence and Oscillation of a sequence, Infinite series, Necessary condition for Convergence, Cauchy's Integral Test, D'Alembert's Ratio Test, Cauchy's nth Root Test, Alternating Series, Leibnitz's Theorem, Absolute Convergence and Conditional Convergence, Power Series.

[T1, T2, R1] [No. of Hrs. 11]

UNIT-IV

Ordinary differential equations: First order linear differential equations, Leibnitz and Bernoulli's equation. Exact differential equations, Equations reducible to exact differential equations. Linear differential equation of higher order with constant coefficients, Homogeneous and non-homogeneous differential equations reducible to linear differential equations with constant coefficients.

[T1, T2, R1] [No. of Hrs. 12]

Text Book(s)(s):

[T1] B. S. Grewal, "Higher Engineering Mathematics", Khanna Publications.

[T2] R. K. Jain and S.R. K. Iyengar, "Advanced Engineering Mathematics", Narosa Publications.

Reference Book(s)(s):

[R1] E. Kresyzig, "Advance Engineering Mathematics", Wiley publications

[R2] G. Hadley, "Linear Algebra", Narosa Publication

[R3] N.M. Kapoor, "A Text Book(s) of Differential Equations", Pitambar Publication.

[R4] Wylie R, "Advance Engineering Mathematics", Tata McGraw-Hill

[R5] Schaum's Outline on Linear Algebra, Tata McGraw-Hill

[R6] Polking and Arnold, "Ordinary Differential Equation using MATLAB", Pearson.

HUMAN VALUES AND PROFESSIONAL ETHICS
(General Elective-I)

Paper Code: ETVHS-513

Paper : Human Values and Professional Ethics

L	T/P	C
2	0	2

Non-University Examination Scheme (NUES)

Note: There will be no End-Term External University Examination. Marks are to be given on the basis of two internal sessional test of 30 marks each and one final Viva-voce project report Examination of 40 marks.

Objectives:

This introductory course input is intended

- a. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.*
- b. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on the correct understanding of the Human reality and the rest of the Existence. Such a Holistic perspective forms the basis of value-based living in a natural way.*
- c. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.*

UNIT-1: Introduction to Value Education

1. Understanding the need, basic guidelines, content and process for value education.
2. Basic Human Aspirations: Prosperity and happiness
3. Methods to fulfill the human aspirations – understanding and living in harmony at various levels.
4. Practice Session – 1.

[T1][R1][R4][No. of Hrs. 08]

UNIT-2: Harmony in the Human Being

1. Co-existence of the sentient “I” and the material body–understanding their needs–Happiness & Conveniences.
2. Understanding the Harmony of “I” with the body–Correct appraisal of physical needs and the meaning of prosperity.
3. Programme to ensure harmony of “I” and Body-Mental and Physical health and happiness.
4. Harmony in family and society: Understanding Human-human relationship in terms of mutual trust and respect.
5. Understanding society and nation as extensions of family and society respectively.
6. Practice Session – 02

[T2][R1][R2][No. of Hrs. 07]

UNIT-3: Basics of Professional Ethics

1. **Ethical Human Conduct** – based on acceptance of basic human values.
2. **Humanistic Constitution and universal human order** – skills, sincerity and fidelity.
3. **To identify the scope and characteristics of people** – friendly and eco-friendly production system, Technologies and management systems.
4. Practice Session – 03.

[T1][R4][No. of Hrs. 08]

UNIT-4: Professional Ethics in practice

1. **Profession and Professionalism** – Professional Accountability, Roles of a professional, Ethics and image of profession.
2. **Engineering Profession and Ethics** - Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world.
3. **Professional Responsibilities** – Collegiality, Loyalty, Confidentiality, Conflict of Interest, Whistle Blowing
4. Practice Session – 04

[T1][T2][T3][R3][No. of Hrs. 07]

Text Book(s):

- [T1] Professional Ethics, R. Subramanian, Oxford University Press.
- [T2] Professional Ethics & Human Values: S.B. Srivastha, SciTech Publications (India) Pvt. Ltd. New Delhi.
- [T3] Professional Ethics & Human Values: Prof. D. R. Kiran, TATA Mc Graw Hill Education.

References:

- [R1] Success Secrets for Engineering Students: Prof. K.V. SubbaRaju, Ph.D., Published by SMART student.
- [R2] Ethics in Engineering Mike W. Martin, Department of Philosophy, Chapman University and Roland Schinzinger, School of Engineering, University of California, Irvine.
- [R3] Human Values: A. N. Tripathy (2003, New Age International Publishers)
- [R4] Value Education website, <http://www.universalhumanvalues.info>[16]
- [R5] Fundamentals of Ethics, Edmond G. Seebauer & Robert L. Barry, Oxford University Press.
- [R6] Human Values and Professional Ethics: R. R. Gaur, R. Sangal and G. P. Bagaria, Eecel Book(s) (2010, New Delhi). Also, the Teachers' Manual by the same author.

***PRACTICAL SESSIONS OF 14 HOME ASSIGNMENTS** will be followed by the students pursuing this paper. (Ref: Professional Ethics & Human Values: S.B. Srivastava, SciTech Publications (India) Pvt. Ltd. New Delhi.)

CONTENT OF PRACTICE SESSION**Module 1: Course Introduction – Needs, Basic Guidelines, Content and Process of Value Education**

PS-1: Imagine yourself in detail. What are the goals of your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcoming in your life? Observe and analyze them.

Expected Outcome:

The students start exploring themselves; get comfortable to each other and to the teacher and start finding the need and relevance for the course.

PS-2: Now a days there is lot of voice about techno-genie maladies such as energy and natural resource depletion, environmental Pollution, Global Warming, Ozone depletion, Deforestation, etc. – all these scenes are man-made problems threatening the survival of life on the earth – what is root cause of these maladies and what is the way out in your opinion?

On the other hand there is rapidly growing danger because of nuclear proliferation, arm race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression and suicidal attempts, etc - what do you think the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

Expected Outcome:

The students start finding out that technical education with study of human values can more solutions than problems. They also start feeling that lack of understanding of human values is the root cause of all the problems and the sustained solution could emerge only through understanding of human values and value based living. Any solutions brought out through fear, temptation or dogma will not be sustainable.

PS-3: 1. Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of following:

- What is naturally acceptable to you in relationship – feeling of respect or disrespect?
- What is naturally acceptable to you - to nurture or to exploit others? Is your living the same as your natural acceptance or different?

2. Out of three basic requirements for fulfillment of your aspirations, right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time and efforts you devote for each in your daily routine.

Expected Outcome:

- The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify the right or wrong, and referring to any external source life text or instrument or any other person cannot enable them to verify with authenticity, it will only develop assumptions.
- The students are able to see that their practice in living is not in harmony with their natural acceptance at most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony.

- The students are able to see that lack of right understanding leading to lack of relationship is the major cause of the problems in their family and the lack of physical facilities in most of the cases; while they have given higher priority to earning of physical facilities in their life ignoring relationship and not being aware that right understanding is the most important requirement for any human being.

Module 2: Understanding harmony in human being – Harmony in myself!

PS-4: Prepare the list of your desires. Observe whether the desires are related with self “I” or body. If it appears to be related with the both, see which part of it is related to self “I” and which part is related to body.

Expected Outcome:

The students are able to see that they can enlist their desires and the desires are not vague, also they are able to relate their desires to “I” and “body” distinctly. If, any desire appears to be related with both, they are able to see that feeling is related to “I” while the physical facility is related to the body. They are also able to see that “I” and “body” are two realities, and most of their desires are related to “I” and not with the “Body”; while their efforts are mostly connected on the fulfillment of the need of the body assuming that it will meet the needs of “I” too.

PS-5:

- {A}. Observe that any physical facilities you use, follows the given sequence with time; Necessary and tasteful – unnecessary & tasteful – unnecessary & tasteless.
{B}. In contrast, observe that any feelings in you are either naturally acceptable or not acceptable at all. If, naturally acceptable, you want it continuously and if not acceptable, you do not want it at any moment.
- List Down all your activities. Observe whether the activity is of “I” or of “body” or with the participation both “I” and “body”.
- Observe the activities with “I”. Identify the object of your attention for different moments (over a period say 5 to 10 minute) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

Expected Outcome:

- The students are able to see that all physical facilities they use are required for limited time in a limited quantity. Also they are able to see that cause of feeling, they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable eve for a single moment.
- The students are able to see that activities like understanding, desires, thoughts and selection are the activities of “I” only; the activities like breathing, palpitation of different parts of the body are fully the activities of the body. With the acceptance of “I”, while activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs, etc. are such activities that require the participation of both “I” and “body”
- The students become aware of their activities of “I” and start finding their focus of attention at different moments. Also they are able see that most of their desires are coming from outsides (through preconditioning or sensation) and are not based on their natural acceptance.

- PS-6:**
- Chalk out the program to ensure that you are responsible to your body – for the nurturing, protection and right utilization of the body.
 - Find out the plants and shrubs growing in and your campus. Find out their use for curing different diseases.

Expected Outcome:

The students are able to list down activities related to a proper upkeep of the body and practice them in their daily routine. They are also able to appreciate the plants wildy growing in and around the campus which can be beneficial in curing the different diseases.

Module 3: Understanding harmony in the family and society - Harmony in Human – Human relationship

PS-7: Form small groups in the class and in that group initiate the dialogue and ask the eight questions related to trust. The eight questions are-

S.No.	Intention (Natural Acceptance)	S.No.	Competence
1.a.	Do I want to make myself happy?	1.b.	Am I liable to make myself always Happy?
2.a.	Do I want to make the other happy?	2.b.	Am I liable to make the other always happy?
3.a.	Does the other want to make him happy?	3.b.	Is the other able to make him always happy?
4.a.	Does the other want to make me happy? What is answer?	4.b.	Is the other able to make me always happy? What is answer?

Let each student answer the question for himself and everyone else. Discuss the difference between intention and competence.

Expected Outcome:

The students are able to see that the first four questions are related to our natural acceptance i.e. intention and the next four to our competence. They are able to note that the intention is always correct, only competence is lacking. We generally evaluate ourselves on the basis of our intention and other on the basis of their competence. We seldom look at our competence and other's intention as a result we conclude that I am a good person and other is a bad person.

PS-8:

1. Observe that on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasion you are disrespecting by way of under evaluation, over evaluation or otherwise evaluation.
2. Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

Expected Outcome:

The students are able to see that respect is right evaluation and only right evaluation leads to fulfilment of relationship. Many present problems in the society are an outcome of differentiation (lack of understanding of respect) like gender biasness, generation gap, caste conflicts, class struggle, and domination through poor play, communal violence, and clash of isms and so on so forth.

All these problems can be solved by realizing that the other is like me as he has the same natural acceptance, potential and program to ensure a happy and prosperous life for him and for others though he may have different body, physical facilities or beliefs.

PS-9:

1. Write a note in the form of a story, poem, skit, essay, narration, dialogue, to educate a child. Evaluate it in a group.
2. Develop three chapters to introduce "social science", its needs, scope and content in the primary education of children.

Expected Outcome:

The students are able to use their creativity for educating children. The students are able to see that they can play a role in providing value education for children. They are able to put in simple words the issues that are essential to understand for children and comprehensible to them. The students are able to develop an outline of holistic model for social science and compare it with the existing model.

Module 4: Understanding harmony in the nature and existence – Whole existence as Co – existence -

PS-10: Prepare the list of units (things) around you. Classify them into four orders. Observe and explain the mutual fulfilment of each unit with other orders.

Expected Outcome:

The students are able to differentiate between the characteristics and activities of different orders and study the mutual fulfilment among them. They are also able to see that human beings are not fulfilling to their orders today and need to take appropriate steps to ensure right participation (in term of nurturing, protection and right utilization) in the nature.

PS-11:

1. Make a chart for the whole existence. List down different courses of studies and relate them to different or levels in the existence.
2. Choose any one subject being taught today. Evaluate and suggest suitable modifications to make it appropriate and holistic.

Expected Outcome:

The students are confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also they are liable to make out how these courses can be made appropriate and holistic.

Module 5: Implication of the above Holistic Understanding of Harmony at all Levels of Existence.

PS-12: Choose any two current problem of different kind in the society and suggest how they can be solved on the basis of the natural acceptance of human values. Suggest the steps you will take in present conditions.

Expected Outcome:

The students are liable to present sustainable solutions to the problem in society and nature. They are also able to see that these solutions are practicable and draw road maps to achieve them.

PS-13:

1. Suggest ways in which you can use your knowledge of engineering / technology / management for universal human order from your family to world family.
2. Suggest one format of humanistic constitution at the level of nation from your side.

Expected Outcome:

The students are able to grasp the right utilization of their knowledge in their streams of technology / engineering / management to ensure mutually enriching and recyclable production systems.

PS-14: The course is going to be over now. Evaluate your state before and after the course in terms of-

- Thoughts
- Behaviour
- Work and
- Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

Expected Outcome:

The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for happy and prosperous society.

PERSONALITY DEVELOPMENT & BEHAVIOURAL SCIENCE
(General Elective-I)

Paper Code: ETVHS-517	L	T/P	C
Paper: Personality Development & Behavioural Science	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.

Objectives and Pre-requisites: Students should have studied subjects such as General languages, social studies and Moral education at school level. The objective of this subject is to prepare the students to become a good citizen and a professional useful to the society.

Learning Outcomes: The knowledge of this subject will give the student a value system which will help him in taking decisions in professional and social life for the benefit of society at large.

UNIT-I

Definition and Basics of Personality, Understanding Traits and Types of Personality, Analyzing strength and weakness (SW), Body Language

[T1, T2][No. of Hrs. 08]**UNIT-II**

Business Etiquettes and Public Speaking: Business Manners. Body Language Gestures, Email and Net Etiquettes, Etiquette of the Written Word, Etiquettes on the Telephone, Handling Business Meetings; Introducing Characteristic, Model Speeches, Role Play on Selected Topics with Case Analysis and Real Life Experiences.

[T1, T2][No. of Hrs. 07]**UNIT-III**

How to Make a Presentation, the Various Presentation Tools, along with Guidelines of Effective Presentation, Boredom Factors in Presentation and How to Overcome them, Interactive Presentation & Presentation as Part of a Job Interview, Art of Effective Listening.

Resume Writing Skills, Guidelines for a Good Resume, How to Face an Interview Board, Proper Body Posture, Importance of Gestures and Steps to Succeed in Interviews. Practice Mock Interview in Classrooms with Presentations on Self; Self Introduction – Highlighting Positive and Negative Traits and Dealing with People with Face to Face.

[T1, T2][No. of Hrs. 08]**UNIT-IV**

Coping Management, Working on Attitudes: Aggressive, Assertive and Submissive Coping with Emotions, Coping with Stress

[T1, T2][No. of Hrs. 07]**Text Book(s):**

- [T1] McGraw, S. J., (2008), “Basic Managerial Skills for All, Eighth Edition”, Prentice Hall of India.
[T2] The Results-Driven Manager (2005). Business Etiquette for the New Workplace: The Results-Driven Manager Series (Harvard Results Driven Manager)

Reference Book(s):

- [R1] Pease, A. & Pease, B. (2006)., “The Definitive Book(s) of Body Language”, Bantam Book(s).
[R2] Scannell, E. & Rickenbacher, C. (2010)., “The Big Book(s) of People Skills Games: Quick, Effective Activities for Making Great Impressions, Boosting Problem-Solving Skills and Improving Customer Service”, McGraw Hill Education

APTITUDE & LOGICAL REASONING LAB
(Open Elective-I)

Paper Code: ETVAS-555

Paper: Aptitude & Logical Reasoning Lab

L	T/P	C
0	2	2

Note:- *The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.*

List of Experiments:

Subject teacher has to perform at least eight experiments based on the topic mentioned in the theory paper by using software packages.



MATHEMATICS FOUNDATION FOR ELECTRONICS LAB
(Open Elective-I)

Paper Code: ETVAS-555

L T/P C

Paper: Mathematics Foundation For Electronics Lab

0 2 2

Note:- *The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.*

List of Experiments:

Subject teacher has to proforma at least eight experiments based on the topic mentioned in the theory paper by using software packages.



BASICS OF ELECTRICAL ENGINEERING LAB**Paper Code: ETVMC-551****L T/P C****Paper: Basics of Electrical Engineering Lab****0 3 3**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. a) Color coding of resistances
b) Resistance in series, parallel and series – Parallel.
2. Capacitors & Inductors in series & Parallel.
3. Study of Multimeter – Checking of components.
4. Voltage sources in series, parallel and series – Parallel
5. Voltage and Current dividers
6. Measurement of Amplitude, Frequency & Phase difference using CRO.
7. Verification of Kirchoff's Law.
8. Verification of Norton's theorem.
9. Verification of Thevenin's Theorem.
10. Verification of Superposition Theorem.
11. Verification of the Maximum Power Transfer Theorem.
12. Designing of a Low Pass RC Filter and study of its Frequency Response.
13. Designing of a High Pass RC Filter and study of its Frequency Response.

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ANALOG ELECTRONICS LAB

Paper Code: ETVMC-553
Paper: Analog Electronics Lab

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. To plot VI characteristics of PN Junction diode in forward bias and Zener diode in reverse bias region.
2. Study of Zener diode as a voltage regulator.
3. To study the working of a half wave and a full wave centre tapped rectifier.
4. To study full wave Bridge rectifier with different filters and calculate ripple factor.
5. Input and output characteristics and calculation of parameters of a transistor in common emitter configuration
6. Measurement of operating point (I_c and V_{ce}) for potential divider biasing circuit.
7. To Plot the VI Characteristics of JFET.
8. Two Stage RC Coupled Amplifier:
 - i. To measure the overall gain of two stages at 1 KHz and compare it with gain of first stage, also to observe the loading effect of second stage on the first stage.
 - ii. To plot the frequency response curve of two stage amplifier.
9. To study Emitter follower circuit & measurement of voltage gain and plotting of frequency response Curve.
10. Feedback in Amplifier: Single stage amplifier with and without bypass capacitor, measurement of voltage gain and plotting the frequency response in both cases.
11. To study push pull amplifier.
12. To study the characteristics of single tuned amplifier.
13. Study of the Colpitt's Oscillator.
14. Study of the Hartley's Oscillator.
15. Study of the Phase Shift Oscillator

Note: The above experiments have to be performed on physical components, however, the Students may also use PSPICE/ Multisim/ Electronic Work Bench (or equivalent open source software) for simulation and evaluation.

DIGITAL ELECTRONICS LAB

Paper Code: ETVMC-555
Paper: Digital Electronics Lab

L	T/P	C
0	3	3

Note:- *The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.*

List of Experiments:

1. To verify and design AND, OR, NOT and XOR gates using NAND gates.
2. To convert a Boolean expression into logic gate circuit and assemble it using logic gate IC's.
3. Design a Half and Full Adder using logic gates.
4. Design a Half and Full Adder using Multiplexer.
5. Design a Half and Full Subtractor using Logic Gates.
6. Design a Half and Full Subtractor using Decoder.
7. Realize a BCD adder
8. Realize a Serial Adder
9. Realize Master-Slave J K Flip-Flop, using NAND/NOR gates
10. Realize Universal Shift Register
11. Design a synchronous counter using D/T/JK Flip-Flop.
12. Design a 4:1 Multiplexer using gates.
13. Design a 1:8 De-Multiplexer using gates.
14. Realize Carry Look ahead Adder / Priority Encoder
15. Simulation of PAL and PLA

Note: The above experiments have to be performed on physical components, however, the Students may also use PSPICE/ Multisim/ Electronic Work Bench (or equivalent open source software) for simulation and evaluation.

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VOCATIONAL WORKSHOP

Paper Code: ETVMC-557
Paper: Vocational Workshop

L	T/P	C
0	2	2

***Objective:** The idea behind this workshop is to educate the student with basic knowledge of using MS/Libre Office tools and to make the student capable of building designs and animations which are a prominent vocation in today's market.*

List of Experiments:

1. MS Word/ LibreOffice - Writer
 - a. Introduction to MS word and creating a document.
 - b. Exercise on font and font size modification with stress on working with bold, italics, underlining, subscripts and superscripts
 - c. Using page setup, header, footer, left alignment, right alignment, centre alignment, justified alignment, bullets and numbering
 - d. Creating a table and modifying a table exercise
 - e. Creating a text box and editing a text box exercise
 - f. Inserting an image and editing an image exercise
 - g. Working with symbols and equations exercise
 - h. Introduction to usage of themes, outlines, effects, quick styles and templates. [06 Hrs.]

2. MS Excel/ LibreOffice - Calc
 - a. Introduction to MS Excel and creating a spreadsheet
 - b. Modifying row and column sizes and adjusting cell size as per contents
 - c. Using sum, average, max and min operations on some arbitrary data.
 - d. Creating formulas with multiple rows and columns
 - e. Creating charts – bar, line and pie
 - f. Interfacing MS Excel and MS Word
 - g. Introduction to usage of themes, outlines, effects, quick styles and templates. [06 Hrs.]

3. MS Powerpoint/ LibreOffice - Impress
 - a. Introduction to MS Popwerpoint and creating a presentation
 - b. Choosing a template, developing a title page and using title box and text boxes
 - c. Inserting images into the presentation
 - d. Working with animations on your presentation
 - e. Using timing tools on your presentation
 - f. Inserting MS Excel data into presentation
 - g. Introduction to usage of themes, outlines, effects, quick styles and templates. [06 Hrs.]

4. MS Publisher/ Scribus
 - a. Introduction to MS Publisher and creating a publication
 - b. Creating a business card
 - c. Creating a newsletter
 - d. Creating a postcard
 - e. Creating a brochure
 - f. Creating a flyer
 - g. Importing MS Word document. [03 Hrs.]

5. Adobe Photoshop/ GIMP
 - a. Introduction to Adobe Photoshop
 - b. Placing one image on top of another image
 - c. Inserting one image into defined frames on another image
 - d. Using Lasso tools and merging images
 - e. Using transform and opacity tools
 - f. Using invert selection and magic wand tools. [03 Hrs.]

6. Adobe Flash/Synfig/FlashDevelop
 - a. Introduction to Adobe flash workspace
 - b. Understanding the flash timeline and types of frames
 - c. Creating a frame by frame animation
 - d. Creating an animation using tweening
 - e. Motion tweening
 - f. Shape tweening.

[06 Hrs.]

Note: The faculty is advised to use their discretion in clubbing the exercises as per necessity. Under all circumstances, the students must be given knowledge of all these components.



PROGRAMMING SKILLS USING C**Paper Code: ETVSD-506****Paper: Programming Skills Using C**

L	T/P	C
3	0	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.

***Objective:** The objective of the paper is to make the students familiar with the basics of programming aspects, using C as the primary language. This course focuses on the programming constructs which are used in other languages as well. This is the introductory course on programming. So it does not require any prerequisite.*

UNIT-I

Concept of algorithms, Flow Chart, Programming using C: C character set, Tokens, identifiers, Variables, Constants, data type in C, simple I/O Function calls from library, arithmetic, relational and logical operations, Conditional Structure: if, else, switch, break, continue and goto.

[T1, T2][No. of Hrs. 11]**UNIT-II**

Concept of loops: for, while and do-while and nested loops.

Arrays: One and Two dimensional .Initialization and some basic operation on 1-D and 2-D array, Strings as array of character. Concept of Pointer, array and pointer relationship, pointer to array, array of pointers, pointer to functions.

[T1, T2][No. of Hrs. 11]**UNIT-III**

Functions: Concept of functions, Parameter passing techniques - call by value and call by reference, library functions.

Structure: Initialization of structure and their application, union.

[T1, T2][No. of Hrs. 11]**UNIT-IV**

Files: Concept of files, Binary files, Text files, File Handling in C Using File Pointers, fopen(), fclose(), Input and Output using file pointers, Character Input and Output with Files.

String: String manipulation Functions and their application.

[T1, T2][No. of Hrs. 12]**Text Book(s):**

[T1] Yashwant Kanetkar, "Test your C Skills", BPB Publications

[T2] Programming in ANSI C, E. Balagurusamy; Mc Graw Hill, 6th Edition.

Reference Book(s):

[R1] Kernighan & Ritchie, "C Programming Language", The (Ansi C version), PHI, 2nd Edition

[R2] K.R Venugopal, "Mastering C", TMH [R3] R.S. Salaria "Application Programming in C", Khanna Publishers, 4th Edition

LINEAR INTEGRATED CIRCUITS

Paper Code: ETVMC-504
Paper: Linear Integrated Circuits

L	T/P	C
3	0	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 12.5 marks

Objective: - The objective of teaching this subject is to give students in depth knowledge of design and analysis of analog IC (OP-AMP, OTA), The internal details of OP-AMP and measurement of its parameters is elaborated. The linear and nonlinear applications, useful for practical circuits, are detailed. Some important and widely used ICs such as 555 timer IC, PLL & VCO, Voltage Regulator IC etc., are also included. The student will need the knowledge of basic analog semiconductor devices.

Pre-requisites: An ability to apply knowledge of mathematics functions. Basic transistor amplifier, understand and implement the working of basic digital circuits.

Learning Outcome: The student is expected to have an understanding of various types of integrated circuits and their applications in making different kinds of circuits. Design and construct waveform generation circuits.

UNIT-I

Introduction to Op-Amp: Differential amplifier using BJT, Block diagram of op-amp, pin diagram of 741 IC, characteristics of ideal Op-Amp, equivalent circuit of Op-Amp, Op-Amp ac and dc parameters. Building blocks of Analog ICs: Differential amplifier using single and two op-amp, virtual ground, circuit for improving CMRR.

[T1, T2] [No. of Hrs: 11]

UNIT-II

Linear & Non Linear Wave shaping: Inverting and non-inverting amplifiers, voltage follower, difference amp, adders, Voltage to current with floating & grounded load, current to voltage converter, practical integrator & differentiator, Clipping & Clamping circuits, Comparators, log/antilog circuits using Op-Amps, precision rectifiers (half & full wave), peak detector, Schmitt trigger circuit.

[T1, T2] [No. of Hrs: 11]

UNIT-III

Waveform generators using Op-Amp: Square and triangular waveform generators (determine period and frequency), saw tooth wave generator, Astable multi-vibrator, Monostable and Bistable Multivibrator.

Active RC Filters: Idealistic & Realistic response of filters (LPF, BPF, HPF, BRF), Butter worth & Chebyshev approximation filter functions.

[T1, T2] [No. of Hrs: 11]

UNIT-IV

Introduction to 555 Timer IC: Functional and block diagram of 555 timer, Application of 555 timer as astable and monostable multivibrator. Operational transconductance amplifier (OTA)-C filters, OTA integrator & differentiator.

Introduction to IC phase locked loops, IC voltage regulators and IC VCO.

[T1, T2] [No. of Hrs: 12]

Text Book(s)(s):

- [T1] S Salivahanan, V.S. Kanchana Bhaskaran, "Linear Integrated Circuits" TMH.
 [T2] Ramakant A Gayakwad "Op - Amps and Linear Integrated Circuits", PHI.

Reference Book(s)(s):

- [R1] D. Roy Choudhary, Shail B Jain, "Linear Integrated Circuits" New Age Publisher, 1999
 [R2] M. Rashid, "Microelectronic Circuit", Cengage Learning Publication.
 [R3] Sedra & Smith, "Micro Electronic Circuits" Oxford University Press, 2000
 [R4] David A Bell, "Operational Amplifiers and Linear IC's", PHI.

ANALOG AND DIGITAL COMMUNICATION**Paper Code: ETVMC-506****Paper: Analog and Digital Communication**

L	T/P	C
3	0	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 should have two questions.

Objectives and Pre-requisites: The objective of teaching this subject is to introduce the students to working of different communication systems and modulation techniques. The student is expected to have a basic understanding of different active and passive circuit elements.

Learning Outcomes: The student is expected to develop a basic understanding of the advantages and limitations of various analog and digital modulation systems on a comparative scale and relate to them while studying practical communication systems.

UNIT-I

Introduction: Need for modulation and demodulation in communication systems, Basic scheme of modern communication system, Frequency spectrum of RF and Microwaves and their applications.

Amplitude Modulation: Derivation of mathematical expression for an amplitude modulated wave showing Carrier and side band components; Significance of Modulation index, spectrum and bandwidth of AM wave, relative power distribution in carrier and sidebands; Elementary idea of DSB-FC, DSB-SC, SSB-SC, ISB and VSB modulations, their comparison and areas of applications; Generation of AM using: Collector Modulator, Balanced Modulator. Principles of demodulation of AM wave using diode detector circuit and synchronous detector.

[T1, T2, T3][No. of Hrs: 11]**UNIT-II**

Angle Modulation: Derivation of expression for frequency modulated wave and its frequency spectrum (without proof and analysis of Bessel function), modulation index, maximum frequency deviation and deviation ratio, BW of FM signals, Carlson's rule; Derivation of expression for phase modulated wave, comparison with frequency modulation. Principles of FM Modulators: Armstrong phase modulator, Armstrong FM transmitters. Basic principles of FM detection using Phase Locked Loop (PLL).

[T1, T2, T3][No. of Hrs: 11]**UNIT-III**

Pulse Modulation: Statement of sampling theorem & elementary idea of sampling frequency for pulse modulation.

Types of Pulse modulation: PAM (Single polarity, double polarity), PWM (Generation & demodulation of PWM), PPM (Generation of PPM); PCM (Generation & demodulation of PCM); Digital to Digital Modulation: RZ, NRZ, AMI, HDB3; Manchester, Differential Manchester, CMI; Digital to Analog Modulation: ASK, FSK, PSK, QPSK, QAM, and GMSK.

[T1, T2, T3][No. of Hrs: 11]**UNIT-IV**

Noise and Multiple Access Techniques: Bit rate & Baud rate Noise; Noise in Analog communication System: Noise in AM System, Noise in DSB & SSB System, Noise in Angle Modulation Systems: Threshold effect in Angle Modulation System, Effect of noise on FM carrier, noise triangle, need for pre-emphasis and de-emphasis, capture effect; Comparison of FM and AM communication systems. Distortion, Attenuation, Transmission Units (db, Neper, dbm, dbmO, dbmi); S/N Ratio and Noise Figure. Multiplexing & Multiple Access Technique, Need of Multiplexing, Time & Frequency Division Multiplexing, Multiple Access Types, Comparisons between Multiple Access Techniques.

[T1, T2, T3][No. of Hrs: 12]**Text Book(s):**

- [T1] Louis E. Frenzel Jr., "Principles of Electronic Communication Systems", 3/e MGH, 2008.
 [T2] Wayne Tomasi, "Advanced Electronic Communications Systems" Pearson, 2013.
 [T3] Kennedy and Davis, "Electronic Communication Systems" TMH, 1999.

Reference Book(s)

- [R1] Simon S. Haykin, Michael Moher, “An Introduction to Analog and Digital Communications” John Wiley, 2006.
- [R2] B P Lathi, “Modern Digital and Analog Communication Systems”, 3/e Oxford press.



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

ENVIRONMENTAL SCIENCE
(Common To All Disciplines)

Paper Code: ETVEN-502
Paper: Environmental Science

L	T/P	C
3	0	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.

***Objective:** The objective of this course is to make students environment conscious. They will be exposed through the fundamental concepts of environment and ecosystem so that they can appreciate the importance of individual and collective efforts to preserve and protect our environment. This course must raise various questions in student's mind that how our environment is inter dependent on various factors and how human being must care for their natural surroundings.*

UNIT-I

Environmental Studies: Ecosystems, Bio-diversity and its Conservation

(i) The Multidisciplinary Nature of Environmental Studies

Definition, scope and importance of Environmental Studies, Biotic and a biotic component of environment, need for environmental awareness.

(ii) Ecosystems

Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structures and function of the following ecosystem:

- (a) Forest ecosystem
- (b) Grassland ecosystem
- (c) Desert ecosystem
- (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

(iii) Bio-diversity and its Conservation

Introduction to biodiversity - definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity : Habitat loss, Poaching of wildlife, man-wildlife conflicts, rare endangered and threatened species (RET) endemic species of India, method of biodiversity conservation: *In-situ* and *ex-situ* conservation.

[T1, R3] [No. of Hrs. 11]

UNIT-II

Natural Resources: problems and prospects

Renewable and Non-renewable Natural Resources; Concept and definition of Natural Resources and need for their management

- Forest resources:* Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources:* Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems, Water conservation, rain water harvesting, watershed management.
- Mineral resources:* Uses are exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources:* World food problems, changes causes by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources:* Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Urban problems related to energy, case studies.
- Land resources:* Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

[T1, R3] [No. of Hrs. 11]

UNIT-III**Environmental Chemistry and Pollution Control****(i) Chemistry of Environment**

(a) *Green Technology*: Principles of Green technology, Zero Waste Technology, Green Chemistry & Its basic principles, Atom Economy, Green Methodologies, clean development mechanisms (CDM), concept of environmental impact assessment,

(b) *Eco-Friendly polymers*: Environmental degradation of polymers, Biodegradable, Photo-biodegradable polymers, Hydrolysis & Hydrobiodegradable, Biopolymers & Bioplastics: polylactic acid, polyhydroxybutyrate, polycaprolactone,. Concept of bioremediation.

(ii) Environmental Pollution

Definition, types, causes, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g) Nuclear hazards. Pollution case studies. Solid waste and its management: causes, effects and control measures of urban and industrial waste.

Chemical toxicology-Terms related to toxicity, impact of chemicals (Hg, As, Cd, Cr, Pb) on environment.

[T1, R3] [No. of Hrs. 11]

UNIT-IV**Disaster Management, Social Issues, Human Population and the Environment****(i) Disaster Management**

Disaster management: floods, earthquake, cyclone and land-slides, nuclear accidents and holocaust, *case studies*.

(ii) Social Issues, Human Population and the Environment

Sustainable development, Climate change, global warming, acid rain, ozone layer depletion, Environmental ethics: Issues and possible solutions, Consumerism and waste products, Wasteland reclamation. Population growth, problems of urbanisation, Environment Protection Act, 1986; Air (Prevention and Control of Pollution) Act, 1981; Water (Prevention and

Control of Pollution) Act, 1974; Wildlife Protection Act, 1972; Forest Conservation Act, 1980; Environmental management, system standards-ISO 14000 series.

[T1] [No. of Hrs. 12]

Text Book(s)(s):

[T1] E. Barucha, TextBook(s) of Environmental Studies for Undergraduate Courses, Universities Press (India) Pvt. Ltd., 2005.

[T2] S. Chawla, A TextBook(s) of Environmental Studies, McGraw Hill Education Private Limited, 2012

References Book(s)(s):

[R1] G. T. Miller, Environmental Science, Thomas Learning, 2012

[R2] W. Cunningham and M. A. Cunningham, Principles of Environment Science: Enquiry and Applications, Tata McGraw Hill Publication, N. Delhi, 2003.

[R3] R. Rajagopalan, Environmental Studies: From Crisis to Cure, 2nd Edition, Oxford University Press, 2011.

[R4] A.K. De, Environmental Chemistry, New Age Int. Publ. 2012,,

[R5] A. Kaushik and C.P. Kaushik, Perspectives in Environment Studies, 4th Edition, New Age International Publishers, 2013

[R6] Environmental Engineering by Gerard Kiely, Tata McGraw-Hill Publishing Company Ltd. New Delhi, 2010.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Open Elective-II)

Paper Code: ETVMC-508

Paper: Electronic Measurements and Instrumentation

L	T/P	C
3	0	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 12.5 marks.

Objectives: The Objective of the course is to introduce fundamentals of Electronics instruments and measurement providing an in-depth understanding of Measurement errors, bridge measurement, basics of transducers, analyzer and multimeter.

Pre-requisites: Basic Knowledge of different Electronics and Electrical quantities to be measured.

Learning Outcomes: Trouble shooting of electronic equipment is an essential requirement of Service sector industry. This course will help to develop skills to become professional technician with capability to measure electrical parameters using various instruments.

UNIT-I

Basics of Measurement: Performance Characteristics of Instruments: Static Characteristics, Dynamic Characteristics.

Errors in Measurement: Types of Static Errors, Gross Errors, Systematic Errors, Random Errors, Sources of Errors and minimization of error. Basic block diagram of an Electronic Measurement system.

Basic Meter Movement: Moving Coil and Moving Iron type of instruments. Electrical Standards & Calibration.

[T1, T2, T3, T4][No. of Hrs: 11]

UNIT-II

Basic Instruments: Block diagram of a Multimeter; DC Ammeter, Multi range ammeters, Extending of ammeter ranges, Effect of frequency on calibration. DC Voltmeter, Multi range voltmeter, extending Voltmeter ranges, Transistor Voltmeter, Chopper type DC amplifier Voltmeter (Micro-voltmeter), True RMS Voltmeter.

Digital Metering: Ramp type DVM, Dual slope integrating type DVM (Voltage to Time conversion), Integrating type DVM (Voltage to Frequency Conversion), Resolution and sensitivity of digital meters, General specifications of a DVM, Digital frequency meter, Universal counter and Electronic counter.

[T1, T2][No. of Hrs: 11]

UNIT-III

Cathode Ray Oscilloscope: Basic Principle, CRT features, Block diagram of oscilloscope, single/dual beam CRO, dual trace oscilloscope. Measurement of phase and frequency by Lissajous figures method. Explanation of time base operation and need for blanking during fly back; synchronization; standard specifications of a CRO, Special features of dual trace, delayed sweep, probes for CRO, Digital storage Oscilloscope: Block diagram and principle of working.

[T1, T2][No. of Hrs: 11]

UNIT-IV Electronic Instruments

Fixed / Variable Frequency AF Oscillator, Function Generator, (sine, square and triangular wave generator). Digital Data Recording, Digital Memory Waveform Recorder (DWR). Introduction to transducers; Data Acquisition System: Introduction and Objective of a DAS.

[T1, T2][No. of Hrs: 12]

Text Book(s):

- [T1] A.K.Sawhney, A course in Elect. & Electronic Measurement and Instrumentation, Dhatpat Rai & Co.
- [T2] Golding & Widis, Electrical Measurement and Measurement instrument, Wheeler Book(s)
- [T3] H.S. Kalsi, Electronic Instruments, Tata Mc-Graw hill.
- [T4] A.D. Heltric & W.C. Copper, Modern Electronic instrumentation & Measuring instruments, Wheeler Publication. 8. H.K.P. Neubert, Instrument transducers, Oxford University press.

Reference Book(s):

- [R1] Carr, Elements of Electronic Instrumentation and Measurement, Pearson Education.
[R2] D. Patranabis, Sensors & Transducers, PHI.
[R3] A.J. Bouwens, Digital Instrumentation, Tata Mc-Graw hill.



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

INDUSTRIAL ELECTRONICS
(Open Elective-II)

Paper Code: ETVMC-510
Paper: Industrial Electronics

L	T/P	C
3	0	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.

Objectives: To get an overview of different types of power semiconductor devices and their switching characteristics. To understand the operation, characteristics and performance parameters of controlled rectifiers to know the practical application for power electronics converters in conditioning the power supply.

Pre-requisites: Students should be well aware of semiconductor devices like diode and transistors.

Learning Outcomes: Able to understand the operation of basic power electronic devices, operation of choppers converters and inverters and able to understand practical application for power electronics converters in conditioning the power supply.

UNIT-I

Power Devices: Need for semiconductor power devices, Power diodes, Enhancement of reverse blocking capacity, Introduction to family of thyristors.

Silicon Controlled Rectifier (SCR): structure, VI characteristics, Turn-On and Turn-Off characteristics, ratings, Factors affecting the characteristics/ratings of SCR, Gate-triggering circuits, Control circuits design and Protection circuits, Snubber circuit.

[T1, T2][No. of Hrs. 11]

UNIT-II

Diac and Triac: Basic structure, working and V-I characteristics, application of a Diac as a triggering device for a Triac.

Insulated Gate Bipolar Transistors (IGBT): Basic structure, I-V Characteristics, switching characteristics, device limitations and safe operating area (SOA) etc.

Application of SCR: SCR as a static switch, phase controlled rectification, single phase half wave, full wave and bridge rectifiers with inductive & non-inductive loads; AC voltage control using SCR and Triac as a switch.

[T1, T2][No. of Hrs. 11]

UNIT-III

Thyristor Commutation Techniques: Introduction, natural commutation, forced commutation, self commutation, impulse commutation, response pulse commutation, external pulse commutation, load side commutation, line side, commutation, complementary commutation.

[T1, T2, T3][No. of Hrs. 11]

UNIT- IV

Invertors and Power Supplies: Introduction to invertors, Principle of operation, single phase bridge invertors, Voltage control of single phase invertors; Introduction to power supply, AC and DC power supply, Switched mode DC power supplies.

[T1, T2][No. of Hrs. 12]

Text Book(s)(s):

[T1] Bhattacharya / S Chatterjee.S.K, “Industrial Electronics and Control”, TMH, 1995.

[T2] Sen “Power Electronics”

[T3] Power Electronics Circuits Devices & Applications, M.R.Rashid -Prentice Hall

References Book(s)(s):

[R1] James T. Humphries, Leslie P., “Industrial Electronics”, Delmar Publications, 1993.

[R2] Power Electronics & Controls, S.K. Dutta

[R3] Power Electronics, M.D. Singh & K.B. Khanchandani, TMH

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION LAB**Paper Code: ETVMC-558****L T/P C****Paper: Electronic Measurements and Instrumentation Lab****0 3 3**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments

1. Study and measurement of voltage, frequency and phase difference of a.c. quantities using C.R.O.
2. Measurement of rise and fall times using a CRO
3. Study and measurement of quantities using D.S.O.
4. Study of function generator.
5. To observe the limitations of a multimeter for measuring high frequency voltages and Currents.
6. Observe the Loading effect of an Analog Multimeter/Digital Multimeter.
7. Measurement of resistance, voltage and current using digital multimeter / clamp meter.
8. Calibration of Ammeter and Voltmeter.
9. Measurement of voltage, current and resistance using dc potentiometer.
10. To measure Q of a coil and observe its dependence on frequency, using a Q-meter
11. Measurement of resistance using Wheatstone's Bridge.
12. Measurement of current/ voltage using Hall effect transducer.
13. Measurement of low resistance by Kelvin's bridge;
14. Measurement of inductance by Maxwell's bridge.
15. Measurement of capacitance by Schering bridge.
16. Measurement of resistance, inductance and capacitance using digital RLC bridge.
17. Measurement of frequency and time period using digital frequency meter.

**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

INDUSTRIAL ELECTRONICS LAB

Paper Code: ETVMC-560
Paper: Industrial Electronics Lab

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments

1. Study of I-V characteristics of DIAC
2. Study of I-V characteristics of a TRIAC
3. Study of I-V characteristics of a SCR
4. SCR as a half wave and full wave rectifiers with R and RL loads
5. DC motor control using SCR.
6. DC motor control using TRIAC.
7. Illumination control circuit using SCR.
8. AC voltage controller using TRIAC with UJT triggering.
9. Study of parallel and bridge inverter.
10. Design of snubber circuit
11. VI Characteristic of MOSFET
12. Study of chopper circuits



**GURU GOBIND SINGH
 INDRAPRASTHA
 UNIVERSITY**

PROGRAMMING SKILLS USING C LAB**Paper Code: ETVSD-566****L T/P C****Paper: Programming Skills Using C Lab****0 3 3**

Note:- *The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.*

List of Experiments:

1. Programs to illustrate the data types and simple arithmetic operators (i.e. area of a circle, conversion of Temperature units)
2. Programs to illustrate the conditional structure (i.e. largest of three numbers, simple calculator by switch – case)
3. Programs to illustrate the loop structure (find sum of a geometric series, find sum of first n natural numbers etc.)
4. Programs to illustrate 1- D array (i.e. find average of marks of a class in one subject)
5. Programs on function (i.e. to find the factorial of a number, to find the HCF of two nos).
6. Programs on function (to highlight the difference between call by value and call by reference)
7. Programs on library functions by using header files (i.e string and char functions).
8. Programs to illustrate 2-D array (i.e. program for matrices addition, Subtraction, multiplication)
9. Programs on structure (i.e.An array of record contains information of employees of a company. Display all the data of those employees having salary > 20000.)
10. Programs on union (to illustrate the difference and similarity between structure and union).
11. Programs on binary file (i.e. Store records of a student in a Binary File “Student.dat” read the file and display the content of the file.)
12. Programs on text file (i.e., to count the no of Lowercase, Uppercase and special characters presents in a text file).

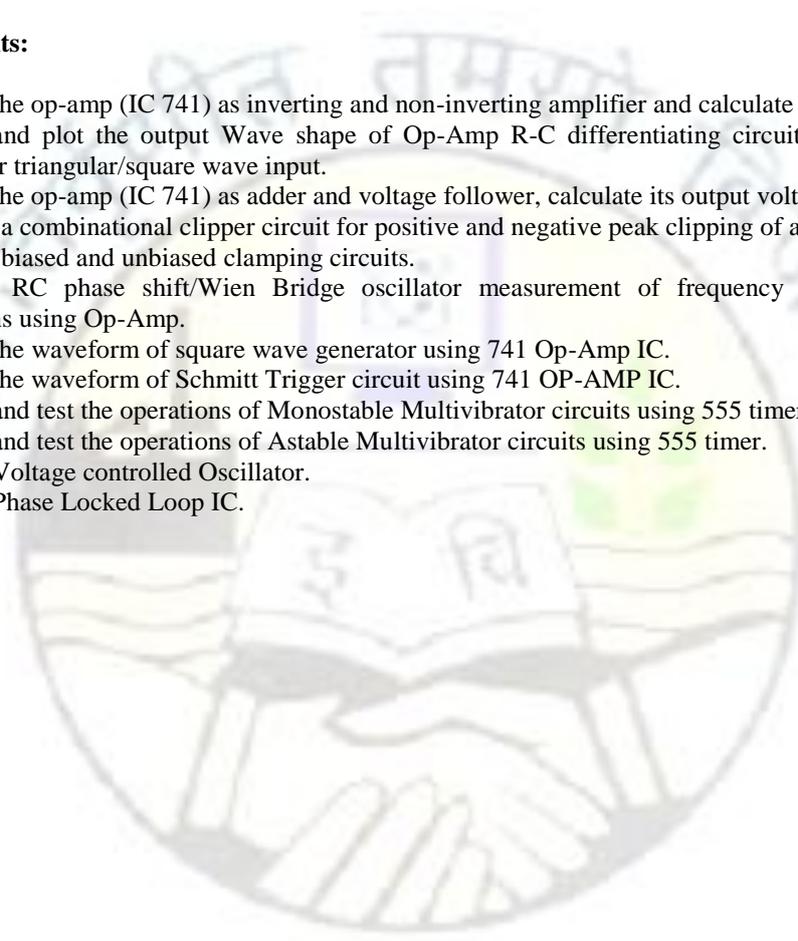
GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

LINEAR INTEGRATED CIRCUITS LAB**Paper Code: ETVMC-554****L T/P C****Paper: Linear Integrated circuits Lab****0 3 3**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. To study the op-amp (IC 741) as inverting and non-inverting amplifier and calculate its gain.
2. Observe and plot the output Wave shape of Op-Amp R-C differentiating circuits, R-C integrating circuits for triangular/square wave input.
3. To study the op-amp (IC 741) as adder and voltage follower, calculate its output voltage.
4. Construct a combinational clipper circuit for positive and negative peak clipping of a sine wave.
5. Construct biased and unbiased clamping circuits.
6. To study RC phase shift/Wien Bridge oscillator measurement of frequency and amplitude of oscillations using Op-Amp.
7. To study the waveform of square wave generator using 741 Op-Amp IC.
8. To study the waveform of Schmitt Trigger circuit using 741 OP-AMP IC.
9. To make and test the operations of Monostable Multivibrator circuits using 555 timer.
10. To make and test the operations of Astable Multivibrator circuits using 555 timer.
11. To study Voltage controlled Oscillator.
12. To study Phase Locked Loop IC.



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

ANALOG AND DIGITAL COMMUNICATION LAB**Paper Code: ETVMC-556****L T/P C****Paper: Analog and Digital Communication Lab****0 3 3**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. To observe the AM pattern on CRO and measure modulation index of the AM signal for different levels of modulating signal.
2. To obtain a FM wave and measure the frequency deviation for different modulating signals.
3. To obtain modulating signal from an AM detector circuit and observe the pattern for different RC time constants and obtain its optimum value for least distortion.
4. To obtain modulating signal from a FM detector (PLL) circuit and plot the discriminator characteristics.
5. To observe the sampled signal and compare it with the analog input signal. Note the effect of varying the sampling pulse width and frequency on the sampled output.
6. To verify the sampling theorem.
7. To time division multiplex the two given signals.
8. To study PAM and its reconstruction.
9. To study the Generation and Reconstruction of PWM/PPM.
10. To study ASK and FSK modulation and demodulation.
11. To study PSK, QPSK and DPSK modulation.
12. To study Minimum Shift Keying modulation and demodulation.
13. To measure the quantization noise in a 3 bit/4 bit coded PCM signal.
14. To feed an analog signal to a PCM modulator and compare demodulated signal with the analog input. Also note the effect of low pass filter at the demodulated output.

Note: The above experiments have to be performed on physical components, however, the Students may also use MATLAB or Scilab (or equivalent open source software) for simulation and plotting the response of the circuits.

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

ENVIRONMENTAL SCIENCE LAB/ FIELD WORK
(Common to All Disciplines)

Paper Code: ETVEN-552	L	T/P	C
Paper: Environmental Science Lab/ Field Work	0	2	2

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments

1. Determination of pH, conductivity and turbidity in drinking water sample.
2. Determination of pH and conductivity of soil/sludge samples.
3. Determination of moisture content of soil sample.
4. Determination of Total Dissolved Solids (TDS) of water sample.
5. Determination of dissolved oxygen (DO) in the water sample.
6. Determination of Biological oxygen demand (BOD) in the water sample.
7. Determination of Chemical oxygen demand (COD) in the water sample.
8. Determination of Residual Chlorine in the water sample.
9. Determination of ammonia in the water sample.
10. Determination of carbon dioxide in the water sample.
11. Determination of nitrate ions or sulphate ions in water using spectrophotometer.
12. Determination of the molecular weight of polystyrene sample using viscometer method.
13. Base catalyzed aldol condensation by Green Methodology.
14. Acetylation of primary amines using eco-friendly method.
15. To determine the concentration of particulate matter in the ambient air using High Volume Sampler.

P.S.: For better understanding of various aspects of environment visits to local areas, depending upon easy access and importance may be planned to any nearby river, forest, grassland, hills and students should write a report based on their observations.

Suggested Book(s):

- [T1] [A. I. Vogel, G. H. Jeffery](#), *Vogel's Text Book(s) of Quantitative Chemical Analysis*, Published by Longman Scientific & Technical, 5th Edition, 1989.
- [T2] dst.gov.in/green-chem.pdf (monograph of green chemistry laboratory experiments).
- [T3] S. Chawla, *Essentials of Experimental Engineering Chemistry*, Dhanpat Rai & Co., 3rd Edition, 2008.
- [T4] S. Rattan, *Experiments in Applied Chemistry*, Published by S.K.Kataria & Sons, 2nd Edition, 2003.
- [T5] W. Cunningham and M. A. Cunningham, *Principles of Environment Science: Enquiry and Applications*, Tata McGraw Hill Publication, N. Delhi, 2003.
- [T6] A. Kaushik and C. P. Kaushik, *Perspectives in Environment Studies*, 4th Edition, New Age International Publishers, 2013.

PROJECT-I

Paper Code: ETVMC-562
Paper: Project-I

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The student has to submit a synopsis at the beginning of the semester for approval from the departmental committee/ project guide in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports.

Project means, for solving live problems faced by telecom industries, or developing an application or hardware prototype, by applying the knowledge and skills obtained through the vocational course in the relevant field.

The students will submit a project report in a presentable manner (printed copy) and give a power point presentation for evaluation by the teacher guide, and an external examiner/ expert from the industry.

