Curriculum Structure & Syllabi

of

B.Tech.

In

ELECTRONICS AND COMMUNICATION ENGINEERING

(w.e.f. 2021-2022)

Overall Credit Structure

Curriculum

Syllabus

Offered By

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M. M. M. UNIVERSITY OF TECHNOLOGY

GORAKHPUR-273010, UP

September-2021

OVERALL CREDIT STRUCTURE FOR B.TECH. PROGRAM

Credit Courses			
Core Courses (CC)**		**Electives Courses (EC)****	
Category	**Min. Credits**	**Category**	**Min. Credits**
Basic Sciences & Maths (BSM)	17	Program Electives (PE)	12
Engineering Fundamentals (EF)	18	Open Electives (OE) (Other Departments)	3
Professional Skill (PS)	4		
Program Core (PC)	64	Humanities & Social Science elective (HSSE)	2
Management (M)	4		
Humanities & Social Science (HSS)	4		
Project (P)	5		
Seminar (S)	2		
Industrial Practice (IP)/ Industrial Elective (IE)	10		
Program link basicscience and engineering courses (PLBSE) (To be decided by the department)	15		
Sub-total	**145**	**Sub-total**	**15**
Grand Total	**160 (minimum)**		

**** subjects to be taught for more than one branch may be scheduled both in odd and even semesters.**

1. Extracurricular Activities Courses (ECA) Two compulsory courses from the following S.No (ii) to (v) non-credit courses: (i) Induction Program (compulsory) (ii) Skill development (iii) Unity and Discipline (NCC or NSS) (iv) Sports, Cultural and Games (v) Personality Development	**Non-Credit**
2. *Audit Courses (AC) Two of the Audit Courses are compulsory	**Non-Credit**

Minor Degree Courses (Optional) from any department	**Credits**
Department Minor (DM) Courses	18-20

Credit Structure for B. Tech. (ECE)

Category Semesters	I	II	III	IV	V	VI	VII	VIII	Total
Basic Sciences & Maths (BSM)	8	4	2	4	-	-	-	-	**18**
Engineering Fundamentals (EF)	5	8	5	-	-	-	-	-	**18**
Professional Skill (PS)	2	2	-	-	-	-	-	-	**4**
Program Core (PC)	-	-	10	18	13	14	9	-	**64**
Management (M)	-	-	-	-	2	2	-	-	**4**
Humanities & Social Science (HSS)	2	2	2	-	-	-	-	-	**6**
Humanities & Social Science Elective (HSSE)	-	2	-					-	**2**
Project (P)	-	-	-	-	-	2	3	-	**5**
Seminar (S)	-	-	-	-	-	2	-	-	**2**
Industrial Practice (IP)/ Industrial Elective (IE)#	-	-	-	-	-	-	-	12	**12**
Program link basic science and engineering courses (PLBSE) (To be decided by the department)	4	3	3	2	3		-	-	**15**
Program Electives (PE)	-	-	-	-	4	4	4	-	**12**
Open Electives (OE) (Other Departments)	-	-	-	-	-	-	3	-	**3**
Total	**21**	**21**	**22**	**24**	**22**	**24**	**19**	**12**	**165**

*Audit Courses

1. Constitution of India
2. Indian Culture and Heritage
3. Indian Architecture
4. Indian Festivals
5. Vaidic Mathematics
6. Astronomy
7. Arts of India
8. Intellectual Property Right
9. Logical Research
10. Professional Ethics
11. Environmental Law
12. Health Law
13. Human Rights
14. Basics of Human health and preventive medicine

CURRICULUM FOR B.TECH. (ECE) PROGRAM

First Year, Semester I

S. N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BSM-101	Calculus and Linear Algebra	3	1	0	4
2.	EF	BEE-101	Fundamentals of Electrical Engineering	3	1	2	5
3.	HSS	BHM-101	Professional Communication	2	0	0	2
4.	BSM	BSM-127	Engineering Physics	3	0	2	4
5.	PS	BEC-103	Electronic Component Testing and Measurement	0	0	4	2
6.	PLBSE	BSM-142	Advanced Environmental Chemistry	3	0	2	4
			Total	**14**	**2**	**10**	**21**
	ECA-I	ECA-100	Induction Program	-	-	-	**0**

First Year, Semester II

S. N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BSM-152	Ordinary and Partial Differential Equations	3	1	0	4
2.	EF	BEC-151	Fundamentals of Electronics Engineering	3	1	2	5
3.	HSS	BHM-155	Engineering Economics	2	0	0	2
4.	EF	BEC-152	Fundamentals of Communication Systems	2	0	2	3
5.	PS	BEC-153	Electronic Workshop	0	0	4	2
6.	PLBSE	BCS-154	Basics of Programming	2	0	2	3

			Skills				
7.	HSSE	BHM-154	Human values &Professional Ethics	2	0	0	2
			Total	**14**	**2**	**10**	**21**
	ECA-II	ECA-200		**-**	**-**	**-**	**0**

LIST OF PROPOSED COURSE CURRICULUM FOR OTHER DEPARTMENT TO BE TAUGHT BY ECE DEPARTMENT

First Year, Semester I (EE-Department)

S. N.	Category	Paper Code	Subject	L	T	P	Credit
1.	EF	BEC-101	Fundamentals of Electronics Engineering	3	1	2	5

First Year, Semester I (IT & Chemical -Department)

S. N.	Category	Paper Code	Subject	L	T	P	Credit
1.	EF	BEC-105	Introduction to Electronics Engineering	2	0	0	2

First Year, Semester II (CS-Department)

S. N.	Category	Paper Code	Subject	L	T	P	Credit
1.	PLBSE	BEC-154	Basic Electronic Components and Circuits	3	0	2	4

Engineering Fundamentals & Department Core

(Electronics &Communication Engineering)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
Year-I							
1.	BEC-101/ BEC-151	Fundamentals of Electronics Engineering		3	1	2	5

2.	BEC-103	Electronic Component Testing and Measurement		0	0	4	2
3.	BEC-105	Introduction to Electronics Engineering		2	0	0	2
4.	BEC-152	Fundamentals of Communication Systems		2	0	2	3
5.	BEC-153	Electronic Workshop		0	0	4	2
6.	BEC-154	Basic Electronic Components and Circuits		3	0	2	4

Course Syllabus

BEC-103 Electronic Component Testing and Measurement

Course category : Professional Skill (PS)

Pre-requisite Subject : NIL

Contact hours/week : Lecture:0, Tutorial: 0, Practical: 4

Number of Credits : 2

Course Assessment methods : Continuous assessment through Viva voce, Practical work/record, attendance, and Major Practical Examination

Course Objectives The objective of this course is to identify different electronic components & to develop the understanding of different instruments.

Course Outcomes : After completion of this course the students are expected to be able to demonstrate the following knowledge, skills, and attitudes:

1. Able to identify electronics components.
2. Understanding of measuring instruments.
3. Able to demonstrate the measuring process using measuring instruments and components.
4. Able to execute the experiment based on DC bridges.
5. Able to examine the experiment performed on breadboard.
6. To study and analyze the signal using CRO and DSO.

Topics covered

List of experiments

Note: At least seven experiments should be performed

1. To identify the components which are used in electronic circuits.
2. To study the resistance, voltage, current measurement by using of multimeter.
3. To get familiarization and to study the operation of a function generator instrument and visualize the types of waveforms produced by a function generator.
4. To study the CRO and to find the Amplitude, phase difference and Frequency of a sinusoidal waveform using CRO.
5. Study of Lissajous patterns and measurement of frequency through Lissajous patterns
6. Measurement of low resistance using Kelvin's double bridge.
7. Measurement of medium resistance using Wheatstone bridge.
8. Measurement of time constant of RC circuit.
9. To study the bread board measurement and perform experiment no 2 on bread board.
10. To study the DSO and measure the amplitude, phase difference and frequency of sinusoidal waveform
11. Measure the values of capacitors using DMM and Schering bridge method.
12. Measure the values of inductors using Maxwell bridge method.
13. To Study of AC and DC Waveforms on CRO & DSO.
14. To study of classification and coding of capacitors-using numerals, directly printed values on capacitors, Ceramic capacitor, and Electrolytic capacitor.
15. Measurement of h-parameters of CE configuration

BEC-101/ 151 FUNDAMENTALS OF ELECTRONICS ENGINEERING

Course category	:	Engineering Fundamentals (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, assignments, quizzes, practical work, record, viva voce and two minor test and one major theory & practical examination
Course Objectives		The objective of this course is to gain knowledge of basic electronic components and develop the understanding of the working principle of different electronic devices such as voltmeter,

multimeter, CRO, etc.

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course:

1. Able to memorize the basic concept of electronic circuits using Diode, BJT (Bipolar Junction Transistor), FET (Field Effect Transistor), etc.
2. Able to execute and examine the general characteristic of electronic circuits.
3. Illustrate the basics of Boolean algebra and logic gates with their realisation using discrete electronic components.
4. Compute different parameters for characterising different circuits like rectifier, amplifiers, integrators, etc.
5. Examine the working principle of digital voltmeter, multimeter using block diagram approach.
6. Discuss and calculate voltage, current, phase and frequency using CRO.

Topics Covered

UNIT-I

Semiconductor materials and properties: electron-hole concepts, Basic concepts of energy bands in materials, concept of forbidden gap, Intrinsic and extrinsic semiconductors, donors and acceptors impurities, Junction diode, p-n junction, depletion layer, v-I characteristics, diode resistance, capacitance, diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage). Diode Applications in rectifier, filters, voltage multipliers, load regulators, clipper and clamper circuits, Breakdown mechanism (Zener and avalanche), Break down characteristics, Zener resistance, Zener diode ratings, Zener diode application as shunt regulator 9

UNIT-II

Transistors (BJT); Basic construction, transistor action, CB, CE and CC configurations, input/output characteristics, Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits. Transistor Amplifier: Graphical analysis of CE amplifier, concept of voltage gains, current gain, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistor CE and CC amplifier configurations. 9

UNIT-III

Field Effect Transistors (JFET and MOSFET): Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed & self-biasing. 9

MOSFET: depletion and enhancement type MOSFET-construction, operation and characteristics. Computation of Av, Ri, Ro, of single FET amplifiers using all the three configurations

Switching theory and logic design: Number systems, conversion of bases, Boolean algebra, logic gates, concept of universal gate, canonical forms, Minimization using K-map.

Operational Amplifiers and Electronics Instruments: 9

Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators Working principle of digital voltmeter, digital multi-meter (block diagram approach), CRO (itsworkingwithblockdiagram),measurementofvoltage,current,phaseandfrequencyusingCRO

EXPERIMENTS

Note: Minimum Five experiments are to be performed

1. To plot the forward/ Reverse Characteristics of Si P-N junction diode.
2. To plot the forward/Reverse Characteristics of Zener diode
3. Study and plot the characteristic of Zener diode as voltage regulator
4. Study of half wave rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, $I_{rms}$and ripple factor.
5. Study of Full wave rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, $I_{rms}$and ripple factor.
6. Study of Bridge Rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, $I_{rms}$and ripple factor.
7. Draw input output characteristic curve of n-p-n transistor in CE configuration
8. Draw input output characteristic curve of n-p-n transistor in CB configuration
9. Draw the drain and transfer curve of JFET
10. Study of OPAMP (741) and calculate the gain in(i) Inverting mode and(ii)Non-inverting mode
11. Study of OP-AMP as a (i) Summer (ii) Integrator (iii) Differentiator; and plot the nature of input & output waveform
12. Study of CRO and multi-meter measurement voltage, frequency, phase difference using CRO along with the testing of electronics component

Books & References

1. Electronic Devices and Circuits-Boylestad and Nashelsky, 6e, PHI, 2001
2. Electronic Devices and Circuits, A Mottershead, PHI,2000, 6e
3. Digital Computer Design, Morris Mano, PHI,2003
4. Electronic Instrumentation-H.S. Kalsi, 2e,TMH, 2007

BEC-152 Fundamentals of Communication Systems

Course category	:	Engineering Fundamentals (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture:2, Tutorial: 0, Practical: 2
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through attendance, assignments, quizzes, practical work, record, viva voce and two minor test

and one major theory & practical examination

Course Objective The objective of this course is to develop a basic understanding of communication and to develop the concept of modulation in communication systems.

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course:

1. Able to understand the basic elements of the communication systems.
2. Familiarity with angle modulation.
3. Able to understand the difference between the Frequency modulation and Phase modulation and its practical applications.
4. Able to represent an analog signal in digital form using Digital modulation.
5. Ability to gather knowledge to understand applications of signal modulation in wireless systems.
6. Develop basic understanding regarding mobile system such as CDMA, GSM etc.

Topics Covered

UNIT-I

Introduction of Communication system: Elements of Communication systems, Need of modulation and Modulation techniques, Baseband and Pass band signals, Introduction of analog and digital modulation, Amplitude Modulation (AM) and demodulation**:** Modulation index, Types of amplitude modulation, Double sideband with Carrier (DSB-C), Double side band without Carrier (DSB-SC), Single Side Band Modulation (SSB), vestigial Modulation (VSB). **6**

UNIT-II

Angle modulation: Types of angle modulation, Frequency Modulation (FM): Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, Phase modulation (PM): Transmission bandwidth of PM Signals, Generation of PM Signals, Demodulation of PM Signals, Comparison of FM and PM system. **6**

UNIT-III

Digital Modulation: Digital representation of analog signals: Introduction, Sampling process, Pulse amplitude modulation, Pulse time modulation, Pulse position modulation, Comparison of PAM and PPM systems, Pulse code modulation, Time Division Multiplexing and Frequency division multiplexing, Crosstalk **6**

UNIT-IV

Noise in Communication Systems: Types of Noise**,** Noise in Signal, Signal to Noise Ratio (SNR), Figure of Merit (FOM). Evolution of mobile communications (CDMA, GSM Technology). **6**

LIST OF EXPERIMENTS

Note: Minimum Five experiments should be performed

1. Plan and select tools to assemble the receiver.
2. Check the functionality of AM/FM receiver and troubleshoot and replace the faulty components.
3. Modulate various signals using AM and FM on the trainer kit and observe waveforms.
4. Demodulate various signals using AM and FM on the trainer kit and observe waveforms.
5. Construct and test IC based AM Receiver
6. Construct and test IC based FM transmitter and receiver
7. Modulate a signal using PAM, PPM, and PWM Techniques.
8. Demodulate a signal using PAM, PPM, and PWM Techniques.

Text Books

1. Communication Systems, Simon Haykins & Moher, 5th Edition, John Willey, India Pvt. Ltd, 2010, ISBN 978 – 81 – 265 – 2151– 7.
2. Kennedy's Electronic Communication Systems (SIE) | 6th Edition Mc Hill Publication.

Reference Books

1. Principles of Communication Systems, H.T aub& D.L. Schilling, TMH, 2011
2. W.C.Y. Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.
3. Modern Digital and Analog Communication Systems, B. P. Lathi, Oxford University Press., 4th edition.

BEC-153 ELECTRONIC WORKSHOP

Course category	:	Professional Skills (PS)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture:0, Tutorial: 0 , Practical: 4
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through attendance, practical work, record, viva voce, and practical major Examination
Course Objective		The objective of this course is to develop the skill and working of different circuit board & prototypes of the designed electronics circuits.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course:

1. To identify the circuit components and their application specially for electronics PCB design.
2. Understand the design processes and production methods used in the manufacturing of a printed circuit board.
3. Understand the use and application of chemical itching and drilling in the manufacture of an electronic circuit.
4. Be able to design and manufacture a prototype printed circuit board and use it to assemble and test an electronic circuit.
5. Able to design rectifier and filter and study their practical applications.
6. Able to have knowledge of these circuits using breadboard.

List of Experiments

Note: Minimum Seven experiments should be performed

1. Winding shop: Step-down transformer winding of less than 5VA.
2. Soldering shop: Fabrication of DC regulated power supply.
3. Printing of circuits on PCB.
4. Design a PCB using Etching & drilling.
5. Coating of etched PCB to protect it from oxidation.
6. Convert the power supply circuit into PCB & simulates its 2D & 3D view.
7. Design a full wave center tapped rectifier & study the effect of capacitive filter & it's output on a virtual oscilloscope.
8. Design a RLC resonance circuit & verify the transient & phase response for different values of R, L&C.
9. Assemble electronic circuit/system on general purpose PCB, test and show the functioning.
10. Construct various electronic circuits on breadboard
11. Identify and test different types of ICs.
12. To study the specifications and working of a Transistor radio kit and perform measurements on it.
13. Study the working of Distortion Meter.
14. To study the working of Spectrum analyzer and determine the bandwidth of different signals.

Text Books

1. Electronics Components and Materials by SM Dhi, Tata McGraw Hill, New Delhi
2. Electronics Device and circuits by Millman and Halkias; McGraw Hill.
3. Principle of Electronics by Albert Paul Malvino; Tata McGraw Hill.

BEC-105	**Introduction to Electronics Engineering**
Course category	: Engineering Fundamentals (EF)
Pre-requisite Subject	: Nil
Contact hours/week	: Lecture: 2, Tutorial:0, Practical: 0
Number of Credits	: 2
Course Assessment methods	: Continuous assessment through attendance, assignments, quizzes, and two minor test and one major theory examination.
Course Objective	The objective of this course is to develop an understanding of the different types of different electronic circuits such as BJT, MOSFET etc. and study the working principles of different instruments.

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course:

1. Able to identify schematic symbols and understand the working principles of electronic devices, e.g., Diode, Zener Diode, semiconductor sensors, BJT, JFET and MOSFET etc.
2. Able to understand the working principles of electronic circuits e.g., Rectifiers, Clipper, Clamper, Amplifiers and Operational Amplifiers etc. also understand methods to analyse and characterize these circuits.
3. Able to understand the functioning and purposes of Measuring equipment such as multimeter, CROs and function generator sets.
4. Understand use, general specifications and deploy abilities of the electronic devices, and assemblies
5. Confidence in handling and usage of electronic devices, tools and instruments in engineering applications
6. Able to rig up and test small electronics circuits.

Topics Covered

UNIT-I **6**

Semiconductor materials and properties: electron-hole concepts, Basic concepts of energy bands in materials, Intrinsic and extrinsic semiconductors, p-n junction diode, V-I characteristics of p-n junction diode, Shockley equation of diode. Diode Applications in rectifier, clipper, and clamper circuits. Breakdown mechanism and characteristics (Zener and avalanche), Zener diode application.

UNIT-II **6**

Basic construction, transistor action, CB, CE and CC configurations, input/output characteristics, Biasing of transistors, comparison of biasing circuits, Concept of early effect, Ebers-Moll model. Applications of BJT as an amplifier and switch, Graphical analysis of CE amplifier, concept of voltage gain, current gain, h- parameter model (low frequency).

UNIT-III **6**

JFET: Basic construction, transistor action, concept of pinch off, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed & self-biasing. MOSFET: depletion and enhancement type MOSFET-construction, operation, and characteristics. Concept and applications of CMOS circuits.

UNIT-IV **6**

Basics of semiconductor sensors and integrated circuits (IC). Operational Amplifiers: Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators. Electronics Instruments: Working principle of digital voltmeter, digital multimeter, cathode ray oscilloscope (CRO).

List of Books:

1. Robert L. Boylestand / Louis Nashelsky “Electronic Devices and Circuit Theory”, Latest Edition, Pearson Education.
2. H S Kalsi, “Electronic Instrumentation”, Latest Edition, TMH Publication.
3. George Kennedy, “Electronic Communication Systems”, Latest Edition, TMH.
4. David A. Bell, “Electronic Devices and Circuits”, Latest Edition, Oxford University Press.

5. Jacob Millman, C.C. Halkias, StayabrataJit, “Electronic Devices and Circuits”, Latest Edition, TMH.
6. David A. Bell, Electronic Instrumentation and Measurements, Latest Edition, Oxford University Press India.

BEC-154 Basic Electronic Components and Circuits

Course category : Engineering Fundamentals (PLBSE)
Pre-requisite Subject : Nil
Contact hours/week : Lecture: 3, Tutorial:0, Practical: 2
Number of Credits : 4

Course Assessment methods : Continuous assessment through attendance, assignments, quizzes, practical work, record, viva voce and two minor test and one major theory & practical examination

Course Objective The objective of this course is to develop an understanding of the different types of different electronic components and circuits such as BJT, MOSFET etc. and study the working principles of different instruments.

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Able to memorize the basic concept of electronic circuits using Diode, BJT, FET, etc.
2. Able to execute and examine the general characteristic of electronic circuits.
3. Illustrate the basics of Boolean algebra and logic gates with their realisation using discrete electronic components.
4. Compute different parameters for characterising different circuits like rectifier, amplifiers, integrators, etc.
5. Examine the working principle of digital voltmeter, millimetre using block diagram approach.
6. Discuss and calculate voltage, current, phase and frequency using CRO.

Topics Covered

UNIT-I

Semiconductor materials and properties: electron-hole concepts, Basic concepts of energy bands in materials, concept of forbidden gap, Intrinsic and extrinsic semiconductors, donors and acceptors impurities, Junction diode, p-n junction, depletion layer, v-I characteristics, diode resistance, capacitance, diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage). Diode Applications in rectifier, filters, voltage multipliers, load regulators, clipper and clamper circuits, Breakdown mechanism (Zener and avalanche), Break down characteristics, Zener resistance, Zener 9

diode ratings, Zener diode application as shunt regulator

UNIT-II

Transistors(BJT and FET);Basic construction, transistor action, CB, CE and CC configurations, input/output characteristics, Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits. Transistor Amplifier: Graphical analysis of CE amplifier, concept of voltage gain, current gain, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistor CE and CC amplifier configurations. 9

UNIT-III

JFET & MOSFET/ Switching theory and logic design: 9

Field Effect Transistors(JFET and MOSFET): Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed & self-biasing. application of MOSFET as an amplifier and switch

Number systems, conversion of bases, Boolean algebra, logic gates, concept of universal gate, canonical forms, Minimization using K-map

UNIT-IV

Operational Amplifier: Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators, Other Circuits based on Operational Amplifiers 9

EXPERIMENTS

Note: Minimum Five experiments are to be performed

1. To plot the forward/ Reverse Characteristics of Si P-N junction diode.
2. To plot the forward/Reverse Characteristics of Zener diode
3. Study and plot the characteristic of Zener diode as voltage regulator
4. Study of half wave rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, I_{rms} and ripple factor.
5. Study of Full wave rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, I_{rms} and ripple factor.
6. Study of Bridge Rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, I_{rms} and ripple factor.
7. Draw input output characteristic curve of n-p-n transistor in CE configuration
8. Draw input output characteristic curve of n-p-n transistor in CB configuration
9. Draw the drain and transfer curve of JFET
10. Study of OPAMP(741) and calculate the gain in(i)Inverting mode and(ii)Non-inverting mode
11. Study of OP-AMP as a (i) Summer (ii) Integrator (iii) Differentiator; and plot the nature of input & output waveform
12. Study of CRO and multi-meter measurement voltage, frequency, phase difference using CRO along with the testing of electronics component

Books & References

1. Electronic Devices and Circuits-Boylestad and Nashelsky, 6e, PHI, 2001
2. Electronic Devices and Circuits, A Mottershead, PHI,2000, 6e
3. Digital Computer Design, Morris Mano, PHI,2003
4. Electronic Instrumentation-H.S. Kalsi, 2e,TMH, 2007

BSM-101 Calculus and Linear Algebra

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Two Minor tests and One Major Theory Examination
Course Objectives	:	The course is aimed to develop the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of basic differential operators in various engineering problems.
2. Understand the concepts of limit theory and nth order differential equations and their applications to our daily life
3. Solve linear system of equations using matrix algebra.
4. Know about qualitative applications of Gauss , Stoke's and Green's theorem.
5. To know the applications of double and triple integration in finding the area and volume.
6. To inculcate the habit of mathematical thinking and lifelong learning.

Topics Covered

UNIT-I 9

Differential Calculus: Limit, Continuity and Differentiability, Mean value theorems. Leibnitz theorem, Partial derivatives, Euler's theorem for homogenous function, Total derivative, Change of variable. Taylor's and Maclaurin's theorem. Expansion of function of two variables, Jacobian, Extrema of function of several variables.

UNIT-II 9

Linear Algebra: Symmetric, Skew-symmetric matrices, Hermitian, Skew Hermitian Matrices, orthogonal and unitary matrices and basic properties, linear independence and dependence of vectors, Rank of Matrix, Inverse of a Matrix, Elementary transformation, Consistency of linear system of equations and their solution, Characteristic equation, Eigenvalues, Eigen-vectors, Cayley-Hamilton theorem, Diagonalization of matrices.

UNIT-III 9

Multiple Integrals: Double and triple integrals, change of order of integration, change of variables. Application of multiple integral to surface area and volume. Beta and Gamma functions, Dirichlet integral.

UNIT-IV 9

Vector Calculus: Gradient, Divergence and Curl. Directional derivatives, line, surface and volume integrals. Applications of Green's, Stoke's and Gauss divergence theorems (without Proofs).

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers
2. Erwin kreyszig: Advanced Engineering Mathematics, John Wiley & Sons.
3. R. K. Jain and Iyenger: Advanced Engineering Mathematics, Narosa Publications.
4. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd.,

BEE-101/ 151 FUNDAMENTALS OF ELECTRICAL ENGINEERING

Course category	:	Engineering Fundamentals (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, assignments, quizzes, practical work, record, viva voce and two minor test and one major theory & practical examination
Course Objective	:	**1.** To demonstrate and understand the basic knowledge of electrical quantities such as current, voltage, power, energy, and frequency to understand the impact of technology in a global and societal context. **2.** To demonstrate and understand the basic concepts of analysis of simple DC and AC circuits, Magnetic Circuits, Transformers and Electrical Machines.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course:

1. Understand the basic properties of electrical elements, and solve problem based on basic electrical circuits & DC network theorems.
2. Understand the fundamental behaviour of AC circuits and solve AC circuit problems.
3. Apply the knowledge gained to explain the behaviour of the circuit at series & parallel resonance of circuit & the effect of resonance.
4. Understand 3 phase balanced and unbalanced, star and delta connected supply and load and to measure power in 3 phase circuits
5. Explain construction and working principle of transformer with background of magnetic circuits.
6. Classify and compare different types of Electrical machines.

Topic Covered

UNIT I **9**

D C Circuit Analysis and Network Theorems:

Circuit Concepts: Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Source transformation, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation, Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem.

UNIT II **9**

Steady- State Analysis of Single-Phase AC Circuits:

AC fundamentals: Sinusoidal, square and triangular waveforms – Average and effective values, Form and peak factors, Concept of phasor, phasor representation of sinusoidally varying voltage and current, Analysis of series, parallel and series-parallel RLC Circuits, Resonance in series and Parallel circuit

Three Phase AC Circuits: Three phase system-its necessity and advantages, Star and delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power, and its measurement

UNIT III **9**

Magnetic Circuit & Single-Phase Transformers:

Magnetic circuit, concepts, analogy between electric & magnetic circuits, B-H curve, Hysteresis, and eddy current losses.

Single Phase Transformer: Principle of operation, Construction, EMF equation, Power losses, Efficiency, O.C & S.C Test and Introduction to auto transformer.

UNIT IV **9**

Electrical Machines:

Concept of electromechanical energy conversion DC machines: Types, EMF equation of generators and torque equation of motor, Characteristics, and applications of DC Generators & motors.

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Induction Motor: Types, Principle of operation, Torque-slip characteristics, Applications

EXPERIMENTS

1. Verification of Kirchhoff's Law.
2. Verification of Norton's Theorem.
3. Verification of Thevenin's Theorem.
4. Verification of Superposition Theorem.
5. Verification of Maximum Power Transfer Theorem.
6. Verification of Series R-L-C circuit.
7. Verification of Parallel R-L-C circuit.
8. Measurement of Power and Power factor of three phase inductive load by two wattmeter method.
9. To perform O.C. and S.C. test of a single-phase transformer.
10. To draw the magnetization characteristics of separately excited dc motor.
11. To perform the external load characteristics of dc shunt motor.

Textbooks:

1. Fundamentals of Electric Circuits, C.K. Alexander and M.N.O. Sadiku; TATA McGraw-Hill.
2. Principles of Electrical Engineering, V. Del Toro; Prentice Hall International.
3. Electrical and Electronics Technology, Edward Hughes; Pearson.
4. Basic Electrical Engineering, D P Kothari, I.J. Nagarath; Tata McGraw Hill
5. Electrical Technology, B. L. Thareja and A. K. Thareja; S. Chand.

BHM-101/151 PROFESSIONAL COMMUNICATION (L-T-P: 2-0-0)

Course Category: Humanities & Social Science (HSS)
Pre-requisite Subject: None
Contact hours/week: 2 Credit
No of Credits: Lecture: 2, Tutorial:0, Practical: 0(Total Credit: 02)
Course Assessment Methods: Continuous assessment through Attendance, home assignments, quizzes, Two Test and one Major Theory Exam.

Course Objective: The course aims:

1) To sensitize the students to understand the role& importance of communication for personal & professional success.
2) To enable learners to exhibit knowledge, skills, and judgment in and around human communication that facilitates their ability to work collaboratively with others in an interpersonal environment.
3) To develop awareness and understanding of applying appropriate communication strategies resulting into the enhancement of learners' employability skills.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1) Use of various facets of communication skills, such as, Reading, Writing, Listening and speaking skills.
2) To identify, formulate and solve the real life problems with positive attitude.
3) To inculcate the habit of learning and developing the communication and soft skills by practice.
4) To enhance effortless speaking and writing skills with the help of rich word power.
5) To develop personality by introducing and inculcating effective presentation strategies.
6) To focus on audio, visual aids for effective oral communication skills

UNIT – I VERBAL COMMUNICATION: 6

Received Pronunciation; how to activate passive vocabulary; Technical/non-technical and Business Presentations; questioning and answer skills; soft skills for professionals; role of body postures, movements, gestures, facial expressions, dress in effective communication; Information/ Desk/ Front Office/ Telephone conversation; how to face an interview/press conference; Group discussions, debates, elocution.

UNIT – II: READING COMPREHENSION 6

Skimming and Scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; use and interpretation of visuals and graphics in technical writing.

UNIT – III: WRITTEN COMMUNICATION: 6

Note Making and Note Taking; summarizing; invitation, advertisement, agenda, notice and memos; official and commercial letters; job application; resume and curriculum vitae; utility, technical, project and enquiry reports; paragraph writing: General – Specific, Problem – Solution, Process – Description, Data – Comment.

UNIT – IV: SHORT ESSAYS: 6

Description and Argument; comparison and contrast; illustration; using graphics in writing: tables and charts, diagrams and flow charts, maps and plans, graphs; how to write research paper; skills of editing and revising; skills of referencing; what is a bibliography and how to prepare it.

Text & Books:

1) Bansal, R.K. & Harrison J.B., (1972) *Spoken English*, Orient Longman, India.
2) Chauhan, Narender Kr. & Singh, Sudhir N., (2013) *Formal Letters*, Pankaj Publication International, New Delhi.
3) Chhabra T.N., (2019) *Business Communication*, Sun India Publication, New Delhi.
4) Dixon Robert J., (1986) *Complete Course in English*, Prentice Hall of India, New Delhi.
5) Jones, Daniel. (2012) *Cambridge English Pronouncing Dictionary*, 18th Edition, Paperback, CUP, India.
6) Lewis, Norman, (2015) *Word Power Made Easy*, Penguin India.
7) Sethi J. & Jindal, (1993) *Handbook of Pronunciation of English Words* - D.V.A, Prentice Hall of India, New Delhi.
8) Sharma R.C. & Mohan Krishna, (2017) *Business Correspondence and Report Writing*, Tata McGraw Hill.
9) Thomson, A. J. & and Martinet A. V., (1997)*A Practical English Grammar*, Paperback,Ed. IV th, Oxford.

BSM-127/177 **ENGINEERING PHYSICS (for Electronics and Communication Engineering)**

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	Physics at 12th standard
Contact hours/week	:	Lecture: 3, Tutorial: 0, Practical: 2
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through attendance, home assignments, quizzes, practical work, record, viva voce and two Minor tests and One Major Theory & Practical Examination
Course Objectives		Understanding of the principle and concepts of Crystallography, Quantum Mechanics, Basic principles of electricity and magnetism, Maxwell's Equations, of and Advanced Materials for their applications Engineering.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Basics of crystallography and its applications in Engineering
2. Quantum Mechanics and its application to understand material properties at atomic level.
3. Basic principles of electricity and magnetism applied in Engineering.
4. Maxwell's equation of electromagnetic theory and its applications in engineering.

5. Basic principles of semiconducting materials and its application.
6. Basic Principles of advanced materials and their applications in Engineering.

Topics Covered

UNIT-I 9

Crystal Structures and X-ray Diffraction: Space lattice, basis, Unit cell, Lattice parameter, seven crystal systems and Fourteen Bravais lattices, Crystal-System Structure, Packing factor (cubic, body and face), Lattice planes and Miller Indices, Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer.

UNIT-II 9

Quantum Mechanics: De Broglie waves and Group velocity concept, Uncertainty principle and its application, Davisson-Germer experiment, Derivation of Schrodinger equation for time independent and time dependent cases. Postulates of quantum mechanics, Significance of wave function, Application of Schrodinger wave equation for a free particle; Particle in a box (one dimensional)

UNIT-III 9

Electrodynamics –I: Basic concepts of Gauss's law, Ampere's law and faradays law of electromagnetic induction. Correction of Ampere's law by Maxwell (concept of displacement current), Maxwell's equation, transformation from integral form to differential form, physical significance of each equation

Electrodynamics –II: Maxwell's equation in free space, velocity of electromagnetic wave, transverse character of the wave and orthogonality of E, H and k vectors, Maxwell's equations in dielectric and conducting medium, velocity of e. m. wave, comparison with free space, penetration depth

9

UNIT-IV

Physics of Advanced Materials

Semiconducting Materials**,** Concept of energy bands in solids, concept of direct and indirect band gap, Carrier concentration and conductivity in semiconductors, Optoelectronic Materials, Superconducting Materials**,** Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Type I and Type II superconductors, BCS theory (Qualitative), Introduction of nanoscience and technology

EXPERIMENTS

1. To determine the specific resistance of a given wire using Carrey Foster's Bridge.
2. To study the variation of magnetic field along the axis of current carrying circular coil.
3. To study the Hall's effect and to determine Hall coefficient in n type Germanium.
4. To study the energy band gap of n- type Germanium using four probe method.
5. To determine e/m of electron using Magnetron valve.
6. To draw hysteresis curve of a given sample of ferromagnetic material.

Books & References

1. Introduction to Solid State Physics- Kittel , 7th edition, Wiley Eastern Ltd.
2. Solid State Physics - S. O. Pillai, 5th edition, New Age International.
3. Quantum Mechanics: Theory and Applications- Ajoy Ghatak, Tata McGraw-Hill
4. Introduction to Electrodynamics- David J. Griffiths Pearson, New International Edition
5. Semiconductor Devices and Application - S.M. Sze, Wiley
6. Introduction to Nano Technology - Poole Owens, Wiley India
7. Engineering Physics by B. K. Pandey and S. Chaturvedi, 2e Cengage Learning Pvt. Limited, India

BSM-142 Advanced Environmental Chemistry (ECE)

Course category	:	Program Link basic Science and Engineering Course (PLBSE)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture:3, Tutorial: 0, Practical: 2
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through attendance, assignments, quizzes, practical work, record, viva voce and two minor test and one major theory & practical examination
Course Objectives	:	➢ Solve environmental engineering problems and persue higher studies using solid foundation in Chemistry and environmental science. ➢ Design and operate various environmental systems in industries as well as higher studies through interactive education.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Gain knowledge about environment and atmospheric composition.
2. Study about natural resource (air, water and soil), its importance and environmental impacts.
3. Knowledge about major sources of environmental pollution.
4. Knowledge about impact of environmental pollution and control measures.
5. To acquire awareness for ethical principle of environment.
6. To gain knowledge as a leader in multidisciplinary areas.

Topics Covered

UNIT-I

Atmospheric composition and principles of contaminant behavior: **9**

The atmosphere of Earth, Contaminant behaviour in the environment, Greenhouse effect - Global temperature-acid rain and Ozone layer depletion.

Contaminants and their natural pathways of degradation and their abatement:

Carbon cycle, Nitrogen cycle, Sulphur cycle, CO formation in atmosphere, Organic pollutants, Pollution from combustion Systems, Coal combustion, Photochemical smog.

UNIT-II

Air Pollution control techniques: **9**

Indoor air Pollution, Control techniques of: Carbon Monoxide, Oxides of nitrogen, Sulphur Dioxide, Volatile Organic Compounds, Instruments techniques to monitor pollution.

UNIT-III

Water Pollution: **9**

Ground and subsurface water contamination, Water pollution sources, Ground water pollution, Ocean pollution.

Water Pollution Treatment:

Introduction, Technological Approach, Chemical degradation of wastes and chemicals, Coagulation and flocculation, Photocatalytic degradation of pollutants. Supercritical water oxidation.

UNIT-IV

Soil Pollution **9**

Soil around us, Soil water characteristics, soil erosion, Soil &pollution, Water resources: Irrigation and Wetlands, Soil pollution management, Nuclear waste management, Sewage treatment, Solid waste management.

LIST OF EXPERIMENTS

1. Study of contaminations in atmosphere.
2. Determination of Henry's law constants of air sample.
3. Determination of an ion balance for a water sample.
4. Measuring the concentration of chlorinated pesticides in water samples.
5. Determination of chloride, bromide, and fluoride in water samples.
6. Analysis of nickel solutions by ultraviolet–visible spectrometry.
7. Soxhlet extraction and analysis of a soil or sediments sample contaminated with n-pentadecane.
8. Determination of a clay–water distribution coefficient for copper.
9. Determination of the biochemical oxygen demand of sewage influent.

10. Determination of inorganic and organic solids in water samples: mass balance exercise.
11. Determination of alkalinity of natural waters.
12. Determination of hardness in a water sample.

Books & References

1. Manahan, Stanley E. Fundamentals of Environmental Chemistry Boca Raton: CRC Press LLC.
2. Sonja Krause, Herbert M. Clark, James P. Ferris, Robert L. Strong Chemistry of the Environment, Elsevier Science & Technology Books.
3. Eugene R. Weiner Applications of Environmental Chemistry, CRC Press, LLC.
4. By Clair N. Sawyer, Perry L. McCarty, Gene F. Parkin Chemistry for environmental engineering and science (5th edition), McGraw-Hill Professional.

BSM-102/BSM-152 Ordinary and Partial Differential Equations

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Two Minor tests and One Major Theory Examination
Course Objectives	:	The course is aimed to develop the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To solve the ordinary differential equations.
2. To solve the partial differential equations using Lagrange and charpit's method.
3. To solve and understand the properties of Bessel`s and Legendre`s differential equation.
4. Application of partial differential equation in real life problems
5. To solve Wave, Heat and Laplace equation upto two dimensions.
6. To inculcate the habit of mathematical thinking and lifelong learning.

Topics Covered

UNIT-I 9

Ordinary Differential Equations I: Linear differential equations with constant coefficients ($n^{th} order$), complementary function and particular integral. Simultaneous linear differential equations, solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications of differential equations to engineering problems

UNIT-II 9

Ordinary Differential Equations II: Series solution of second order differential equations with variable coefficient (Frobeneous method). Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials.

UNIT-III 9

Partial Differential equations I: Partial differential equations of the first order, Lagrange's solution, Charpit's general method of solution, Partial differential equations of the second order: Constant coefficient and reducible to constant coefficient, Classification of linear partial differential equations of second order.

UNIT-IV

Partial Differential Equations II: Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions, Laplace equation in two dimensions, Heat conduction equations up to two dimensions

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers
2. Erwin kreyszig: Advanced Engineering Mathematics, John Wiley & Sons.
3. R. K. Jain and Iyenger: Advanced Engineering Mathematics, Narosa Publications.
4. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd..
5. M.D. Raisinghania, Ordinary and Partial Differential Equations. S Chand Publications.

BHM-105/155 **ENGINEERING ECONOMICS**

Course category	:	HMSD
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 2, Tutorial : 0, Practical: 0
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through attendance, home assignments, quizzes and Two Minor tests and One Major Theory Examination

Course Objective :

1. To make fundamentally strong base for decision making skills by applying the concepts of economics.
2. Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product or service, with a view to determining the price offer.
3. Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision-making process to justify or reject alternatives/projects.
4. Be equipped with the tools necessary in forecasting product demand.
5. Understand and analyze the macro environment affecting the business decision making.
6. To make students understand basic elements of Indian Economy.

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Students will acquire basic knowledge in Engineering & managerial economics, which allows students to gain theoretical and empirical skill of economics.
2. To make Engineering students prepared for economic empowerment so that they could manage their wealth, help them in starting their own business or during managerial period.
3. Students will develop Interdisciplinary skills which can help them to thrive in the life-long changing environment in various fields of Industry of Economics.
4. Students will acquire practical knowledge of economics, the kind of markets, cost theory, various issues of demand and other major economic concepts.
5. Able to explain succinctly the meaning and definition of managerial economics; elucidate on the characteristics and scope of managerial economics.
6. Able to describe the techniques of managerial economics.
7. Able to explain the applications of managerial economics in various aspects.
8. To learn about the management and economics of the industrial environment

Syllabus

UNIT-I 6

Introduction: Meaning, Nature and Scope of Micro Economics, Macro Economics and ManagerialEconomics, Decision making Process with reference to Managerial economics, Managerial Economics and its application in engineering perspective.

UNIT-II 6

Concepts of Demand and Supply: Demand Analysis, Law of Demand, Determinants of Demand,Elasticity of Demand: Price, Income and cross Elasticity. Uses of concept of elasticity of demand in managerial decision, Law of Supply.

UNIT-III 6

Production function, Overview of cost: fixed cost, variable cost, average cost, marginal cost, opportunity cost, An over-view of Short and long run cost curves.

UNIT-IV 6

Market Structure: Perfect Competition, Imperfect competition – Monopolistic, Oligopoly, Monopoly, National Income: Concept and Measurement of National Income.

Books & References

1. Mote, Paul and Gupta, Managerial Economics, T M H, New Delhi.
2. H L Ahuja, Managerial Economics, S Chand & Co. New Delhi
3. P.L. Mehta, Managerial Economics, Analysis, Problems and Cases, Sultan Chand Sons, NewDelhi.
4. Prof. D.N. Kakkar , Managerial Economics for Engineering, PHI publication, New Dell
5. Varshney and Maheshwari, Managerial Economics, Sultan Chand and Sons, New Delh

BHM-104/154 HUMAN VALUES & PROFESSIONAL ETHICS-1 (L-T-P: 2-0-0)

Course Category: Humanities & Social Science Elective (HSSE)
Pre-requisite Subject: None
Contact hours/week: 2 Credit
No of Credits: Lecture: 2, Tutorial: 0, Practical: 0
Course Assessment Methods: Continuous assessment through attendance, home assignments, quizzes and Two test, one major theory Examination.

Course Objective: The Course aims:

1) To give basic insights and inputs to the students to inculcate Human values to grow as a responsible human being with holistic personality.
2) To instil Professional Ethics in the student and enabling them to maintain ethical conduct while discharging their professional duties.
3) To enable them to understand and appreciate versatility and universality of human values and their pivotal role in professional field.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1) To create conducive environment for professionals to grow as good and responsible human beings imbibing values and ethics.
2) Understanding the significance of environment.
3) Developing humanitarian outlook.
4) Assess their own ethical values and the social context of problems.
5) Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human.
6) Identify the multiple ethical interests at stake in a real-world situation or practice.

UNIT-I **6 Hours**

Origin, Meaning, and Definition of Value, Types of Values, Individual Value, Family Value, Societal Value, Human Value, Value in Education System, Understanding Happiness and Prosperity, Self-Exploration and Natural Acceptance.

UNIT-II **6 Hours**

Harmony in family, Harmony in Society, Values Leading to Harmony, Creating a world family, Harmony in Nature, Environment and Sustainable Developmental, Legal aspects of Environment, Holistic Perspectives of Values, Existence and Co-existence.

UNIT-III **6 Hours**

Origin, Meaning and Definition of Ethics, Ethics: The science of the Morality of The Art of Correct Living, Ethics in Human Acts, Ethics and Religion, Ethical Norms and Laws, Ethics in Literature, Ethics in Science and Technology.

UNIT-IV **6 Hours**

Ethical Approaches: Theistic Approach, Atheistic Approach, General and Special Ethics, Professional Ethics: Ethics at work-place, Ethics as Skill, Values and Ethics, Ethics with Value Education, Managerial and Business & Corporate Ethics, Corporate Social Responsibilities.

Text & Books:

1. Bangaria,G.P et.al,(2010)*A foundation course in Human Values and Professional Ethics*, Excel books.
2. Govindrajan, M. (2013) *Professional Ethics and Human Values*, Eastern Economy Edition.
3. Naagrazan, R.S. (2018)*Textbook on Professional Ethics and Human Values*, New age International. Misra, Anuranjan and Shukla, Dr. R.K.,*Human values and Professional Ethics*.
4. Fernando, A.C.,(2009) *Business Ethics: An Indian Perspective*, Pearson,India.