SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

Applied Science (Physics)

Semester/Year		I/II	Program		B.Tech
Subject Category	BS	Subject Code:	PYB101	Subject Name:	**Applied Physics**

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work		L	T	P	
60	20	10	10	30	20	150	3	0	1	4

Prerequisites:

Intermediate Physics (Theory and Lab)

Course Objective:

This course is designed to impart fundamental knowledge about some areas of physics which are to the core of emerging technologies. It is planned to provide knowledge about Quantum mechanics, Lasers , Fiber Optics, Hologhphy, Superconductor, Nano materials, Dielectric and piezoelectric materials. Laboratory sessions are also designed which are blended with experiments on the fundamental and advanced areas of physics.

Course Outcomes:

After completion of the course, students will be able

CO1	To understand basic quantum physics and apply it to the behaviour of a system at the microscopic level and solve the problems.
CO2	To understand process of lasers and explain the requirements, properties, classification of various lasers. They will also develop an understanding of optical fibers and and holography and can explin the characteristics, various losses, dispersion in optical fibers and procsees of construction and reprocuction of holograms.
CO3	To understand the basic concepts and theory of semiconductor for devices application.
CO4	To understand and know the principle of superconductors and nanomaterils. The sdunednt will be able to explain types of superconductors, their properties and applications, nano technology and its applications.
CO5	To understand the characteristic of Dielectrics and Piezoelectric materials in terms of their applications .
CO6	To perform experiments related to the course contents.

UNITs	Descriptions	Hrs.	CO's
I	**Quantum mechanics:** Planck's quantum hypothesis, Wave-particle duality of radiation, de-Broglie matter waves, Davisson and Germer's electron diffraction experiment, Compton effect, Phase and group velocity, Heisenberg uncertainty principle and its applications, wave function and its significance, Eigen value and Eigen function, Schrödinger wave equations, particle in one dimensional potential box.	8	
II	**Lasers:** Properties of lasers, the basic process of lasers, Population-inversion, classification of lasers, working of He-Ne, Ruby, Nd: YAG and CO_2 lasers, Applications of Lasers in Communication, Medical and Industry. **Optical fibers:** Light guidance through optical fibres, the qualitative idea of critical and acceptance angle, types of fibers, numerical aperture, V-Number, intermodal & material dispersions in fiber. **Holography:** Basic principle of holography, Construction and reconstruction of Image on hologram and applications of holography.	8	
III	**Basic of semiconductors**: Density of energy states, Energy-band formations, direct and indirect band gap, Effective mass, Fermi energy	8	

	levels. Mobility and carrier concentrations (intrinsic). Radiative and non-radiative recombination mechanisms in semiconductors . **Semiconductor Devices**: Properties of PN junction and I-V diode equation, Photovoltaic cell, LED Materials for fabrication, LED Structures and Characteristics; Injection Laser Diode (ILD) - Laser action in semiconductors , structures and efficiency.		
IV	**Superconductors**: Free electrons theory of metals, Temperature dependence of resistivity in superconducting Metals , Effect of magnetic field (Meissner effect) , Temperature dependence of critical field, Type I and Type II superconductors, BCS theory (Qualitative), High-temperature superconductors and Applications of superconductors. **Nanomaterials**: Basic principle of nanoscience and technology, structure, properties ad uses of Fullerene and Carbon nanotubes, Applications of nanotechnology.	8	
V	**Dielectrics Materials**: Polar and Non-Polar Dielectrics, Dipole moment and Polarization, Dielectric constant& Polarization, Gauss law in Dielectric, the relation between electric field vector E, Pand D. **Piezoelectric materials**- Ferroelectric materials , Piezoelectric effect, direct and converse parameter definitions, Piezoceramics, Piezopolymers, Piezoelectric materials as sensor and transducers.	8	
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. To determine the width of a single slit from the study of Fraunhoffer diffraction pattern using a He-Ne Laser.
2. To determine the frequency of A.C. mains using an electrical - vibrator.
3. Determination of Planck's constant.
4. To determine the frequency of A.C. mains using a sonometer.
5. To study the nature of polarization of light using the half-wave plate.
6. To find the numerical aperture of the given fibre.
7. To determine the refractive indices μ_0 and μ_e of Quartz prism for ordinary and extraordinary rays using the spectrometer.
8. To determine the wavelength of monochromatic source of light by Fresnel's biprism.
9. To study the V-I characteristics of semiconductor diode
10. To study V-I Characteristics of LED
11. To study the V-I characteristics of tunnel diode
12. To determine the radius of curvature of a given plano-convex lens by Newton's rings method.
13. To determine the absorption coefficient of a glass plate by "LUMMER- BRODHUM" photometer.
14. To determine the resolving power of a telescope.
15. To determine the wavelength of light emitted by mercury vapour lamp using a diffraction grating.

Text Book-

- Concepts of Modern Physics, Arthur Beiser, Tata McGraw-Hill,6th edition,2009.
- Optics, A.Ghatak, McGraw Hill, 2012.
- Engineering Physics , Hitendra K Malik& A.K. Singh, Mc Graw Hill Education Private Limited
- Elements of Modern Physics, S.H. Patil
- Kiruthiga Sivaprastha, Modern Physics, S. Chand
- A Textbook of Engineering Physics, Gaur and Gupta, Dhanpat Rai Publishers, New Delhi,8th edition,.2011.

Electrical Engineering Materials by A.J. Dekker, PHI publication

Reference Books-

- Lasers and non-linear optics, B.B.Laud, New Age international,3rd edition,2011

- Solid State Physics, S.O.Pillai , New Age International Ltd, publishers
- Electromagnetic Theory for Telecommunications, C.S.Liu and V.K.Tripathi, Foundation Books, New Delhi,2007
- Quantum Mechanics by L.I. Schiff, Mc Graw Hill Co.
- A Textbook of Quantum Mechanics by Piravonu Mathews, K. Venkatesan (Tata McGraw Hill)
- Cady, W. G., Piezoelectricity, Dover Publication
- Piezoelectric Materials & Devices: Application in Engineering And Medical Sciences By M.S. Vijiya .CRC Press.
- Electrical Engineering Materials Physics Properties by SP A Seth, Dhanpat Rai Publications.

Modes of Evaluation and Rubric

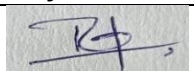
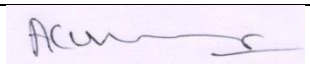
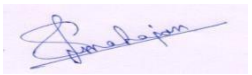
Assignments, Quiz, Tests & exams

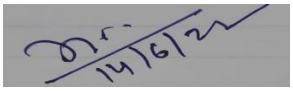
Criteria	**Excellent (3 points)**	**Good (2 points)**	**Fair(1 point)**
Quiz	> 80%	60-80%	40-60%
Test & exam	>75%	60 -75%	< 60%
Assignment	Assignment is coherently organized and the logic / solution to all the problems provided. Writing is clear and concise and persuasive.	Assignment is generally well organized and logic / solution to maximum of the problems provided barring few inaccuracies.	Assignment is poorly organized and difficult to follow. Does not flow logically from one part to another with lots of mistakes

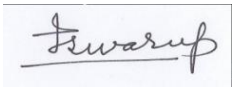
List/Links of e-learning resource

- https://nptel.ac.in/courses/122107035/#
- https://nptel.ac.in/course.html
- http://www.tndte.gov.in/site/wp-content/uploads/2016/08/Engineering-physics.pdf
- https://physicstoday.scitation.org
- Barbastathis, G. and Sheppard C., Optics, https://ocw.mit.edu/courses/mechanical-engineering/2-71-optics-spring-2009/

Recommendation by Board of studies on	14.06.2022
Approval by Academic council on	
Compiled and designed by	Jetendra Parashar
Subject handled by department	Applied Science (Physics)





SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

Department of Electronics Engineering

Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics & Instrumentation Engineering
Semester and Year of study	B. Tech 1st Year 1st Semester
Subject Category	Engineering Science Course (ESC)
Subject Code: EIA101	Subject Name: Basic Electronics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			**Total Marks**				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Fundamentals of Physics

Course Objective:

1. The course intends to provide an overview of the principles, operation and application of the analog building blocks like diodes, BJT etc. for performing various functions.
2. This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved.
3. To provide an overview of amplifiers.
4. Sufficient knowledge is provided so that students will be able to use this course as the basis for other advanced courses like Analog Circuits and Linear IC's, Power Electronics etc.
5. Continue to enhance oral and written communication skills specifically directed to the practice of electronics engineering.

Course Outcomes:

After completion of this course students will be able to

CO1: Acquire knowledge of semiconductor devices and their working mechanism.

CO2: Analyze various electronic circuit configuration.

CO3: Analyze the circuit characteristics and compute its parameters.

CO4: Design various electronic circuits.

UNITs	Descriptions	Hrs.	CO's
I	Semiconductor diodes: Introduction to PN junction diode, Zener diode and its applications, Rectifiers, Regulators, Clipping and Clamping circuits, Tunnel diode, Schottky diode, Varactor diode and their applications, Optoelectronic devices: PIN diode, Light Emitting Diode (LED), Laser diode.	8	CO1, CO4
II	Bipolar Junction Transistors (BJTs): Physical structure and operation modes, Transistor as an amplifier, Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers, Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias, D.C. analysis of transistor circuits, load line and Q point, Transistor as a switch: cut-off and saturation modes.	10	CO2, CO4
III	AC Analysis of BJT: Transistor Model: r_e Model, h-parameter model, Small Signal Analysis, BJT Frequency Response.	12	CO3
IV	Multistage Amplifiers: Multistage or Cascade amplifier: classification of multi-stage amplifier, coupling and frequency response of cascaded systems, effect of cascading on voltage gain, current gain, phase, input and output impedances and bandwidth of cascaded or multistage	8	CO2

	amplifiers. Types of coupling, cascade and cascode circuits, Miller theorem, Darlington pair, bootstrap circuit.		
V	Tuned Amplifiers: Single tuned, double tuned and stagger tuned amplifiers characteristics and their frequency response. Power amplifier: Class A large signal amplifiers, second-harmonic distortion, Transformer coupled audio power amplifier, Class B amplifier, Class AB operation push pull and Class C power amplifiers. Comparison of their efficiencies, types of distortion.	7	CO2
Guest Lectures (if any)		Nil	
Total Hours		45	

Suggestive list of experiments:

1. To draw the forward and reverse bias characteristics of a semiconductor PN junction diode.
2. To draw the characteristics of Zener diode as a voltage regulator. (CO1)
3. To observe the waveform of Clamper circuit. (CO1)
4. To observe the waveform of Clipper circuit. (CO1)
5. To observe the output waveform of Half wave rectifier. Calculate its parameters like PIV, Ripple Factor, Form Factor and Efficiency. (CO1)
6. To observe the output waveform of Full wave rectifier. Calculate PIV, Ripple Factor, Form Factor and Efficiency. (CO1)
7. To plot common base input and output characteristics for PNP bipolar junction transistor. (CO2)
8. To plot common emitter input and output characteristics for NPN bipolar junction transistor. (CO2)
9. To design a positive clipper circuit using a 1 kHz square wave with a 10 volt peak-to-peak magnitude as the input signal. (CO4)
10. To design a negative clamper circuit using a 1 kHz square wave with a 10 volt peak-to-peak magnitude as the input signal. (CO4)
11. To draw the frequency response of two stage RC coupled class A amplifier using transistor. (CO2)
12. To draw the frequency response of two stage Direct coupled class A amplifier using transistor. (CO2)

Text Book-

1. Integrated Electronics - Millman Halkias, TMH
2. Electronic Devices & Circuits – Boyelstad & Nashelsky – PHI
3. Electronic Devices & Circuits – David A. Bell – PHI
4. Principles of Electronic Devices – Malvino TMH

Reference Books-

1. Microelectronic Circuits- Sedra, Smith.
2. Electronics Circuits And Systems- Owen Bishop
3. Intuitive Analog Circuit Design- Marc T. Thompson
4. Starting Electronics (Fourth Edition)-Keith Brindley

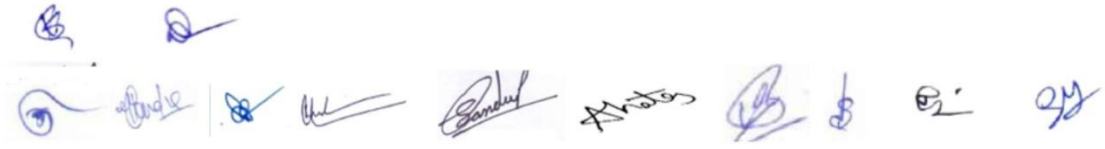
List and Links of e-learning resources:

1. https://nptel.ac.in/courses/117103063/
2. https://www.electronics-tutorials.ws/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/ Assignments, lab work, end-semester examinations, and end-semester practical examinations.

Recommendation by Board of studies on	14.06.2022
Approval by Academic council on	
Compiled and designed by	



SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
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Department of Electronics Engineering
Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics & Instrumentation Engineering
Semester and Year of study	B. Tech 1st Year 1st Semester
Subject Category	Engineering Science Course (ESC)
Subject Code: EIA102	Subject Name: Fundamentals of Instrumentation

Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical			**Total Marks**				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	20	30	10	10	150	3	0	2	4

Prerequisites:

Basic Electrical Concepts, Mathematics (Matrices, Laplace Transform, Differential Equations and Complex Variables).

Course Objective:

The course aims at providing the fundamental concepts of the Instrumentation and Measurement, static and dynamic characteristics of instruments and their error analysis, provides an overview of the laboratory instruments such as CRO, function generators, multimeters etc. It also includes the measurement of passive electrical elements like R, L,C.

Course Outcomes:

Upon completion of the course, student will be able to

- CO1: Identify, conceptualize, demonstrate and apply the fundamentals of measurement science, measuring instruments and their characteristics.
- CO2: Investigate and analyze the working of electrical measuring instruments.
- CO3: Analyze the working of Cathode Ray Oscilloscope (CRO) and other laboratory equipments.
- CO4: Analyze DC bridges used for measurement of Resistance.
- CO5: Analyze AC bridges used for measurement of Capacitance and Inductance.

CO- PO Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1								
CO2	3	3	2	2								
CO3	3	3	2	2								
CO4	3	3	2	2								
CO5	3	3	2	2								

UNITs	Descriptions	Hrs.	CO's
I	**Basic concept of Instrumentation**: Functional elements of an instrument, classification of measuring instruments, static and dynamic characteristics of the instruments, Standards & Calibrations of Instruments, Errors in measurement, uncertainty analysis.	12	CO1
II	**Analog Instruments:** Classification of analog instruments, D' Arsonval type Galvanometer, Principle of operation and construction of various analog indicating types of instruments, sources of error, extension of ranges and calibration of ammeters & voltmeters.	10	CO3
III	**Laboratory Instruments**: Cathode Ray Oscilloscope - types, construction and operation, measurement of amplitude, phase and	08	CO2

	frequency with CRO, Lissajous patterns, Digital Storage Oscilloscope (DSO), Spectrum Analyzers, Harmonic Distortion Measurement, Function Generators, Digital Multimeter, Digital frequency meter.		
IV	**Measurement of Resistance:** Measurement of resistance (Low, Medium and High): voltmeter-ammeter method, ohmmeter, DC Bridges: Wheatstone bridge-design, arrangement of ratio arms, bridge sensitivity, errors in bridge circuits, Sensitivity and Calibration adjustments of Wheatstone bridge, Kelvin bridge, Various application of DC bridges, milli ohmmeter, mega ohmmeter, Meggar, Wagner earthing device	08	CO4
V	**Measurement of Inductance and Capacitance (A. C. Bridges):** Measurement of inductance using A. C. Bridges: Maxwell's bridge, Various applications of Maxwell Bridges, Hay's Bridge, Anderson's Bridge, vector impedance meter, Q factor measurement. Measurement of Capacitance using A. C. Bridges: Schering bridge, Wien's Bridge, storage and dissipation factors.	07	CO4
Guest Lectures (if any)		Nil	
Total Hours		45	

Suggestive list of experiments:

1. Study of different parts of CRO. Measure the amplitude, frequency & phase difference. Study of CRO demonstration unit and working of CRT and observe the effect of switched faults on the working of important sections.
2. Study of digital LCR meter and measurement of unknown L, C, R parameters.
3. Study of universal frequency counter and measurement of all parameters.
4. Determination of unknown inductance using Maxwell Inductance Bridge.
5. Determination of unknown inductance and Q factor using Maxwell Inductance Capacitance bridge method.
6. Measurement of unknown value capacitance using Wien's Capacitance Bridge.
7. Measurement of unknown value capacitance using Schering Bridge.
8. Measurement of unknown value of Inductance using Anderson Bridge.
9. Measurement of unknown value Inductance using Hay's Bridge.
10. Measurement of unknown Frequency using Wien's Bridge

Text Books -

1. Cooper W.D., Helfrick A.D. "Modern Electronic Instrumentation Measurement", Prentice Hall.
2. Sawhney A.K. "Electrical and Electronics Measurements & Instrumentation", Dhanpat Rai& sons.
3. Doeblin E.D., Measurement system, Tata McGraw Hill., 4th ed.
4. Kalsi, Electronic Instrumentation, Tata McGraw Hill

Reference Books

1. Terman & Petit, Electronic Measurement.
2. Carr, Instrumentation, Pearson Education

List and Links of e-learning resources: MCET – http://sgsmcet.co.in/eie .

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/ Assignments, term work, end-semester examinations, and end-semester practical examinations.

Recommendation by Board of studies on	07.06.2024
Approval by Academic council on	
Compiled and designed by	Dr. Shilpa Datar

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE

(Engineering College), VIDISHA M.P.

(An Autonomous Institute Affiliated to RGPV Bhopal)

Program: Electronics Instrumentation
Department of Electrical & Electronics Engg.

Semester/Year		II /I	Program		B.Tech
Subject Category	B.Tech	Subject Code:	EEA104	Subject Name:	**Electrical Machine & Transformer**

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Quiz	Ass	End Sem	LW	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	0	3

Prerequisites:

Basics of Physics, Mathematics
Basics of electrical circuits

Course Objective:

1. Familiarize with the basic concept of Power in AC circuits.
2. Impart the knowledge of Transformer.
3. Impart the knowledge of AC and DC Motors, Generators and Alternators.

Course Outcomes:

Course Outcomes - On the successful completion of this course student should be able to:

CO1: Acquire knowledge and able to demonstrate AC circuits, transformers, electric machine. (BL1, BL2)
CO2: Able to analyse different AC circuits, performance of transformer and Electrical machines. (BL3, BL4)
CO3: Evaluate different performance parameters of transformer and electrical machine (BL3, BL5)
CO4: Able to design simple AC circuits and provide solution to simple problems related to transformer and AC/DC machine. (BL 3, BL 6).

UNITs	Descriptions	Hrs.	CO's
I	**AC Circuits-** Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series). Three phase balanced circuits, voltage and current relations in star and delta connections.	8	CO1,CO4
II	**Transformers-** Review of laws of electromagnetism, MMF, flux, and their relation. Single-phase transformer basic concepts and construction features, transformer induced emf equation, losses in transformers, three phase transformer and its configuration.	8	CO2, CO4
III	**DC machines (Motor and Generator)-** Constructional details of DC machine, working principle of DC machines, classification of DC machine, EMF equation, characteristic of separately excited and self excited generators. Working principle of DC motor, Importance of back EMF, Starting of DC motor	8	CO2,CO3,CO4
IV	**AC machines (Induction Motor)-** 3-phase induction motor: General principle, construction, squirrel cage and phase wound rotor, slip, frequency of rotor current. 1-phase induction motor: Difference between three phase and single phase induction motor, types of single phase induction motor with construction and working principle	8	CO3,CO4
V	**Synchronous Machine (Motor and Alternators)-** Motor: stationery armature, details of construction salient and non-salient type motor, function of damper winding, speed and frequency. Alternator: various types of alternator, construction working principle, generated EMF equation.	8	CO2, CO4
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. To determine active power, reactive power, of a single phase R-L series circuit. (C02)
2. To determine the line current, phase current, line voltage, phase voltage, phase current and total power of a three phase balanced star connected load. (CO2)
3. To determine the transformation ratio and perform polarity test on a single phase transformer. (CO2)
4. To conduct open circuit test and short circuit test on single phase transformer and calculate iron losses and copper loss (C02)
5. To perform load test on single phase transformer and determine voltage regulation and efficiency. (C03)
6. To determine the armature circuit resistance of series field winding resistance, shunt field winding resistance of DC machines. (C02)
7. To perform a load test on 3 phase induction motor and to draw its performance characteristics (C02)
8. Speed control of DC shunt motor by field weakening and armature rheostatic control method (C02)
9. No-load test on Schrage motor (3 phase inverted induction motor) and to draw graph between injected EMF Vs speed.(C02).
10. Speed control of DC motor (CO2, CO3).
11. Speed control of induction motor (CO2, CO3).
12. To determine the regulation of alternator by synchronous impedance method. (CO3).
13. To plot the V-curves of a synchronous motor at no load. (CO2).
14. To perform the parallel operation of alternator with the existing bus-bar. (CO2)

Reference Books-

1. Engineering Circuit Analysis by William H hayt and Kimberly
2. Electrical machinery by Dr P S Bhimbra
3. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
5. Hughes, Electrical and Electronic Technology, Pearson Education IX Edition

Modes of Evaluation and Rubric

Theory	Attendance (5)	Midsem (10)	Performance (5)	Total (20)
	Attendance (5)	Assignmet (5)	-	Total (10)
		Quiz (10)	-	Total (10)
Practical	Attendance (5)	Lab Work (5)	Total (10)	
		Quiz (10)	Total (10)	

List/Links of e-learning resource

- https://nptel.ac.in/courses/108/108/108108076/
- IISC banglore
- https://nptel.ac.in/courses/108/105/108105132/
- IIT kharagpur

Recommendation by Board of studies on	14/6/22
Approval by Academic council on	16/6/22
Compiled and designed by	Prof. C S Sharma/Dr. Jitendra Kumar Tandekar
Subject handled by department	Electrical and Electronics Engg.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Applied Science

Semester/Year		First Sem		Program		B.Tech.				
Subject Category	Departmental Core	Subject Code:	MAB101	Subject Name:	Linear Algebra and Calculus					
Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		Total Marks				
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	1	-	4

Prerequisites:

Basic of Differentiations, Integrations and Matrices.

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes:

This course is to develop students abilities to:

1. Apply Differential Calculus to Notions of Curvature. Apart from some other Applications they will have a Basic Understanding of Taylor's Theorem, Maxima and Minima.
2. The Fallouts of Partial Differentiation that is Fundamental to Application of Analysis to Engineering Problems.
3. Finding area and Volume using Double and Triple Integrals.
4. The Essential Tool of Matrices and Linear Algebra in a Comprehensive Manner. Student will understand Matrices and their Application to Solve System of Linear Simultaneous Equations.
5. Students will Gain Experience with Problem Solving in Boolean Algebra and Graph Theory.

UNITs	Descriptions	Hrs.	CO's
I	**Differential Calculus:** Lebnitz Theorem, Expansion of functions by Maclaurins and Taylors theorem (one variable), Maxima & Minima of two variables, Curvature: Radius and Centre of Curvature for Cartesian Coordinates.	8	1
II	**Partial Differentiation:** Partial Derivatives of Higher Order, Homogeneous Functions, Euler's Theorem, Total differentiation, Errors and Approximations.	8	2
III	**Integral Calculus :** Definite Integral as a Limit of the Sum, Application in Summation of Series, Multiple Integrals, Change of order of Integration, Application of Double and Triple Integrals (Area & Volume).	8	3
IV	**Matrix :** Definition, Types & Properties of Matrices, Elementary Transformation, Rank of Matrix, Consistency of Linear System of Equations and their solutions, Eigen Values and Eigen Vectors, Cayley Hamilton Theorem and its Application to find the Inverse.	8	4

V	**Boolean Algebra & Graph Theory:** Algebra of logic, Principal of Duality and basic theorem, Boolean expression and Boolean functions, Definition of Graph, Types of Graphs, Sub Graphs, Walk, Path and Circuits,.	8	5
TOTAL HOURS		40	

Reference Books:

1. Engg. Mathematics: By B.S. Grewal
2. Boolean Algebra: R.S. Agrawal
3. Engg. Mathematics: by H.K. Dass
4. Engg. Mathematics : By B. V. Rammanna

Recommendation by Board of studies on	14-06-2022
Approval by Academic council on	16-06-2022
Compiled and designed by	Applied Maths Board of Studies, Chairman Dr. Shailesh Jaloree

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Humanities and Management

Semester/Year		II Year	Program		B. Tech All Branches
Subject Category	MAC	Subject Code:	MAC101	Subject Name:	**Universal Human Values**

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Quiz	Assignment	End Sem	Lab-Work	Quiz		L	T	P	
00	00	00	00	60	20	20	100	-	-	2	Grade

Prerequisites:

During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

Course Objective:

At the end of the course, the students will be able to:

1. Develop a holistic perspective based on exploration about others and themselves.
2. Develop clarity, importance of harmony and humanity towards family, society and nature/existence.
3. Strengthen self-reflection.
4. Develop commitment and courage to act.

Course Outcomes:

1. By the end of the course, students will become aware of themselves, and their surroundings (family, society, nature)
2. They would have better critical ability.
3. They would become more responsible in life; and keeping human relationships and human nature in mind will be able to handle problems with sustainable solutions.
4. They would also become sensitive to their commitment towards nature and existence.
5. They would be able to apply what they have learnt to their own selves in different day-to-day real-life scenarios, at least a beginning would be made in this direction.

UNITs	Descriptions	Hrs.	CO's
I	Introduction - Need, Basic Guidelines, Content and Process for Value Education 1. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration 2. Continuous Happiness and Prosperity- A look at basic Human Aspirations 3. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority 4. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario	8	1

	5. Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility.		
II	Understanding Harmony in the Human Being - Harmony in Myself! 1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' 2. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility 3. Understanding the characteristics and activities of 'I' and harmony in 'I' 4. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail 5. To ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods. Identifying from one's own life. Differentiate between prosperity and accumulation.	6	2
III	Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship 1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness. 2. Understanding the meaning of Trust; Difference between intention and competence. 3.Understanding the meaning of Respect, Difference between Respect and differentiation; the other salient values in relationship. 4.Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. 5. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Gratitude as a universal value in relationships. Elicit examples from students' lives.	4	3
IV	Understanding Harmony in the Nature and Existence - Whole existence as Coexistence 1. Understanding the harmony in the Nature. 2. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature. 3. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. 4. Holistic perception of harmony at all levels of existence. 5. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	8	4
V	Implications of the above Holistic Understanding of Harmony on Professional Ethics 1. Natural acceptance of human values. 2. Definitiveness of Ethical Human Conduct. 3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 4. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop	9	5

	appropriate technologies and management patterns for above production systems. 5. Strategy for transition from the present state to Universal Human Order: a. as socially and ecologically responsible engineers, technologists b. At the level of society: as mutually enriching institutions and organizations.		
Guest Lectures (if any)		5	
Total Hours		40	
Suggestive list of experiments:			
Text Book-Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010			
Reference Books- 1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.			
Modes of Evaluation and Rubric			
Questionnaire,Quiz,Presentation and standard procedure will be followed .			
List/Links of e-learning resource			
https://fdp-aicte-india.org https://vvce.ac.in			

Recommendation by Board of studies on	26/02/2022
Approval by Academic council on	
Compiled and designed by	Dr. Manorama Saini and Dr. VeenaDatar
Subject handled by department	Humanities and Management