The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

DEPARTMENT OF PHYSICS

Programme: Bachelor of Science (B.Sc.)

SYLLABUS FOR:

F.Y.B.Sc. - Physics

Programme: - Bachelor of Science (B.Sc.)

Certificate Course per term

As Per National Education Policy 2020 Guidelines with effect from the academic year 2023-24

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

Affiliated to University of Mumbai

Choice Based Credit System (CBCS) with effect from the academic year 2023-24

Faculty of Sciences

Preamble: Developing Curriculum that is progressive and purposeful to create positive improvement in Physics education is the main goal of Department of Physics, V. G. Vaze College (Autonomous). Basic principles of Physics are applied in diverse fields such as Computer Science, Information Technology, Aeronautics, Nanotechnology, Photonics etc. Thus the syllabus has interdisciplinary approach. An undergraduate student well trained in basic principles of physics and its application is expected to have possibility of employment in various frontiers of research and industries.

Programme Specific Outcomes

PSO	**PSO Description** **A student completing graduation in Physics (B.Sc.) will be able to attain the following**
PSO1	Students will learn fundamental principles of Physics and will be able to suggest innovative solutions to problems in Applied Physics.
PSO2	Students will develop an ability to use contemporary experimental apparatus, analytical tools and virtual tools.
PSO3	Students will be able to opt for higher education including interdisciplinary fields and will be able undertake competitive examinations.

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Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

NEP –2020 Structure as per government Gr 20 April 23

SEMESTER	MAJOR (2+2=4)		MINOR (2+2=4)	OE (3+1=4)	VSC/SEC VSC (2+2=4) SEC(2+2=4)	AEC,VEC,IKS	OJT,FP, CEP,CC, RP	TOTAL	CUM.CR/SEM
	MANDATORY	ELECTIVE							
I	**Theory: Classical Mechanics and Optics** (2L); **Practical-** (2P)	-	**Theory: Classical Mechanics and Optics** (2L); **Practical** (2P)	**Theory: Physics in everyday life** (2L); **Practical** (2P)	**Theory: Applied Physics** (2L); **Practical: Basic skills in Physics** (2P)	Basket from Arts and Commerce	Basket from Arts and Commerce -	22	20-22
II	**Theory: Structure of Solids and X-ray** (2L); **Practical** (2P)	-	**Theory: Structure of Solids and X-ray** (2L); **Practical** (2P)	**Theory: Fundamentals of Computers** (3L) **Practicals based on computers** (2P)	**Theory: Electricity and Electronics** (2L); **Practical: Advanced skills in physics lab** (2P)	-	-	22	20-22
TOTAL	8		8	8	8	10	2	44	

Note:

- **1 credit = 1 hour**
- **1 credit = 2 hours of practical**

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Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

Revised Syllabus in Physics (Theory and Practical) as per Choice Based Credit System in view of NEP 2020

F. Y. B.Sc. Physics Syllabus 2023-24

Sr. No.	Vertical Title	Semester I	Semester II
1	Major **(2+2= 4)**	**Physics Paper I: Classical Mechanics and Optics (2L)**	**Physics Paper I: Structure of Solids and X-rays (2L)**
		Physics Practical: (2P)	**Physics Practical: (2P)**
3	Minor **(2+2= 4)**	**Physics Paper I: Classical Mechanics and Optics (2L)**	**Physics Paper I: Structure of Solids and X-rays (2L)**
		Physics Practical: (2P)	**Physics Practical: (2P)**
4	Generic/Open Elective **(3+1= 4)**	**Physics in everyday life (3L) (for Arts & commerce Students)**	**Fundamentals of Computer (3L) (for Arts & commerce Students)**
		Practical based on Physics in everyday life (1P) (for Arts & commerce Students)	**Practical based on Fundamentals of Computer (1P) (for Arts & commerce Students)**
5	VSC **(2+2= 4)**	**Applied Physics I (2L)**	**NA**
		Basics Skills in Physics (2P)	**NA**
6	SEC **(2+2= 4)**		**Electricity and Electronics (2L)**
			Advanced Skills in Physics (2P)
7	AEC		
8	VEC		
9	IKS		-
10	CC/FP	-	-
11	Internship	-	-
12	Research Project/ Research Methodology	-	-

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Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

FYBSC SEMESTER- I

Major/ Minor

Course Code	Paper Title	Credit
VGVUSMPH101	**Classical Mechanics and Optics**	2

Course objectives: To enable students to

1. To study the Newton's laws and apply them in calculations of the motion of simple systems.
2. To study the use the free body diagrams to analyze the forces on the object.
3. To learn the concepts of friction and the concepts of elasticity, fluid mechanics and be able to perform calculations using them.
4. The concepts of interference and diffraction will be learn
5. Demonstrate quantitative problem solving skills in all the topics covered

Unit	Content	No of Lectures
1	**Chapter 1: Newton's Laws of Motion** 1.1Newton's first, second and third laws of motion, 1.2Interpretation and applications 1.3Pseudo forces, Inertial and non-inertial frames of reference. 1.4Worked out examples (with friction present) **Chapter 2 : Elasticity** 2.1Review of Elastic constants Y, K, η and σ; 2.2Equivalence of shear strain to compression and extension strains. 2.3Relations between elastic constants	**10**
2	**Chapter 3: Interference –I (Division of wave front)** 3.1 Introduction 3.2 Young's Double Slit Experiment **Chapter 4: Interference –II (Division of Amplitude)** 4.1 Interference in thin films 4.2 Interference in wedge shaped film 4.3 Fringes in Wedge shaped films 4.4 Applications of wedge shaped film 4.5 Newton's Rings 4.6 Applications of Newton's ring experiment	10

3	**Chapter 5: Introduction to Diffraction** 5.1 Introduction, Huygens's - Fresnel theory 5.2 Distinction between interference and diffraction 5.3 Fresnel and Fraunhoffer types of diffraction **Chapter 6: Fraunhoffer Diffraction** 6.1 Introduction, Fraunhoffer diffraction at a single slit Intensity distribution in diffraction pattern due to a single slit 6.2 Fraunhoffer diffraction at a double slit, 6.3 Distinction between single slit and double slit diffraction pattern and missing orders 6.4 Plane diffraction Grating, Theory of plane transmission grating, Width of principal maxima	10
Total Number of Lectures		30

Course Outcomes

CO1 The students should be able to apply Newton's laws of motion to given problem.

CO2 The students will understand and apply the concept of elasticity and calculate elastic parameters for various problems

CO3 To understand the important phenomena in optics.

CO4 To understand the concept and types of diffraction.

References:

1. Halliday, Resnick and Walker, Fundamental of Physics (extended) – (6th Ed.), John Wiley and Sons.
2. H. C. Verma, Concepts of Physics – (Part–I), 2002 Ed. BharatiBhavan Publishers.
3. Brijlal, Subramanyam and Avadhanulu A Textbook of Optics, 25th revised ed.(2012) S. Chand
4. Jenkins and White, Fundamentals of Optics by (4th Ed.), McGraw Hill International.

Additional References:

1. Thornton and Marion, Classical Dynamics – (5th Ed)
2. D S Mathur, Element of Properties of Matter, S Chand & Co.
3. R Murugeshan and K Shivprasath, Properties of Matter and Acoustics S Chand.
4. C L Arora, Optics, S Chand.
5. Hans and Puri, Mechanics –, 2nd Ed. Tata McGraw Hill

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Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

FYBSC SEMESTER- I

Major/ Minor

PHYSICS PRACTICAL-I

Course Code	Paper Title	Credit
VGVUSMPHP101	Classical Mechanics and Optics	2

Learning Outcome:

On successful completion of this course students will be able to:

i) To demonstrate their practical skills.

ii) To understand and practice the skills while doing physics practical.

iii) To understand the use of apparatus and their use without fear.

iv) To correlate their physics theory concepts through practical.

v) Understand the concepts of errors and their estimation.

A. Regular experiments:

Sr.No	Name of Group –A Experiments
1.	To study the Flywheel
2.	Torsional Oscillation: To determine modulus of rigidity η of a material of wire by torsional oscillations
3.	Bifilar Pendulum
4.	To determine rigidity modulus (η) of material by method of vibrations - Flat spiral Spring
5.	Surface Tension of liquid by Capillary tube Method
6.	Young's Modulus by Vibration
7.	Bar Pendulum
Sr. No	**Name of Group –B Experiments**
1	Combination of Lenses: To determine equivalent focal length of a lens system by magnification method (Arrow)
2	Spectrometer: To determine of angle of prism.

3	Spectrometer: refractive index μ of the material of prism
4	To study Thermistor characteristic: Resistance vs Temperature
5	Newton's Rings To determine radius of curvature of a given convex lens using Newton's rings.
6	Wedge Shaped Film: Determination diameter of thin wire/ film.
7	Determination of focal length of lens by u-v method

C) Any one out of following is equivalent to two experiments from section A or B

1. Students should collect the information of at least five Physicists with theirwork. Report that in journal.
2. Students should carry out mini-project up to the satisfaction of professor In-charge of practical.
3. Study tour, students participated in study tour must submit a study tour report.

Note: Minimum 5 from each group and total 10 experiments should be completed in the first semester. All experiments are to be reported in a journal. Certified journal is must to be eligible to appear for the semester end practical.

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

SEMISRER-I

Open Elective

(For Arts & Commerce students)

Course Code	Paper Title	Credit
VGVUOE107	**Physics in Everyday Life**	**3**

COURSE TITLE: PHYSICS IN EVERYDAY LIFE – (Fundamentals of electricity and measurement techniques)

Course objective: To enable students to

1. Learn the basics of electricity.
2. Learn the D.C & A.C currents also know the concept of power and house hold consumptions.
3. Learn the safety norms while dealing with electricity.
4. Get skills to measure the fundamental and derived quantities.
5. Students will learn conversion factor between SI and CGS system and other units used in everyday life

Sr. No	Module No	Contains	Lectures
	Unit I	**Chapter -1 : Basics of Electricity** 1.1 Introduction 1.2 Electron theory 1.3 Conductor, Insulator and semiconductor 1.4 Electric charges 1.5 Current: d.c current; ac current 1.6 Voltage : d.c voltage; a.c voltage 1.7 Simple electric circuit 1.8 D.C circuits: series and Parallel (I, V, P) 1.9 Introduction to A.C : Current and voltage 2.0 Power, Household power consumption and calculation 2.1 Safety measures	**15**
1	**Unit II**	**Chapter-2 : Measurements of Fundamental quantities** **2.1** Introduction to International system of units 2.2 Accuracy, precision of instruments and error in measurements 2.2 Measurements of length and their inter conversions 2.3 Measurements of mass and their inter conversions; difference between mass and weight 2.4 Measurements of time and their inter conversions	**15**

		2.5 Measurements of temperature and their inter conversions 2.6 Measurement of current	
	Unit III	**Chapter-3 : Measurements Derived quantities** 3.1 Measurement of Force 3.2 Measurement of speed 3.3 Measurement of volume and their interconversion 3.4 Measurement of Sound 3.5 Measurement of pressure 3.6 Measurement of radiation 3.7 Measurement of frequency	**15**

Course Outcomes:

CO1 The students will understand the concept and consumption of electricity.

CO2 The students will understand the importance of safety norms while dealing with electricity.

CO3 The students will acquire the skills of measurement

CO4 The students shall acquire the knowledge of conversion between the various systems used in everyday life.

Reference Books:

1. **Concepts of Physics By H.C. Varma Volume -2**
2. **Concepts of Physics By H.C. Varma Volume -1**
3. **Measurements and instrumentation By Sohoni**
4. **Measurements and instrumentation By Kalsi**

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

SEMISRER-I

Open Elective

(For Arts & Commerce students)

Course Code	Paper Title	Credit
VGVUOE107	**Physics in Everyday Life**	**1**

Practical base on Fundamentals of electricity and measurement techniques

Learning Outcome:

On successful completion of this course students will be able to:

i) Handle different measuring instruments and learn how to take precise readings with them

ii) Make useful calculations using the measurements taken from different instruments

iii) Handle basic electric components and circuits without fear.

iv) Understand and measure different electrical parameters applicable to daily usage

v) Understand the concepts of errors and their estimation

Sr No	Name of Experiments
1.	Find the thickness of glass slab/thin wire/ bob using screw gauge
2.	Find the inner and outer diameter of cylinder using Vernier calliper
3.	Find the radius of capillary bore using Travelling microscope
4.	Find the volume of water using measuring cylinder
5.	Use of digital multimeter to measure AC and DC Current and voltage
6.	Use of digital multimeter to find Resistance

All experiments are to be reported in a journal. Certified journal is must to be eligible to appear for the semester end practical.

Note: The practical examination will be conducted as per the guideline given by appropriate authorities and will be communicated to you.

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

F.Y.B.Sc –SEMESTER - I

Vocational Skill Course (VSC)

(For Physics Students)

Course Code	Paper Title	Credit
VGVUSVS104	**APPLIED PHYSICS – I**	2

Course objectives: to enable students to

1. The students know the working principle and properties of laser.
2. Study different types of lasers used in industry, medicine and research.
3. Study one of the applications Holography.
4. Learn the origins and types of errors in measurements.
5. Study basics of error analysis and reporting.

Unit	Content	No of Lectures
1	**Chapter 1: Introduction to Laser:** 1.1 Introduction, 1.2 transition between atomic energy states, 1.3 Principle of Laser, 1.4 Properties of Laser: Coherence Properties of LASER, Spatial Coherence Length, Directionality, Intensity	**10**
2	**Chapter 2: Laser working & Fundamentals** 2.1 Study of Helium–Neon Laser 2.2 Study of Nd: YAG Laser 2.3 Study of Ruby Laser 2.4 Application of Laser 2.5 Holography	10
3	**Chapter 3: Measurements and Error Analysis** 3.1 The uncertainty of measurements, accuracy, precision 3.2 Types of errors 3.3 Fractional error, standard deviation 3.4 Propagation of errors 3.5 Significant figures, rounding and reporting of result	10
Total Number of Lectures		30

Course outcome:

CO1	Understand the components and working principles behind different types of laser
CO2	Understand the principle and application of holography
CO3	The students will Be able to identify errors in experiments and measurements
CO4	The students shall Be able to do the calculations for error analysis and report the result properly

References:

1. **SP**: Modern Physics Concept and Applications – Sanjeev Puri, Narosa Publication.
2. **RK**: Properties of matter and Acoustics – R Murugeshan and K. Shivaprasath, S Chand & Co. Ltd. (2005-Ed)
3. Dealing with Uncertainties: A Guide to Error Analysis – Manfred Drosg, Springer Berlin, Heidelberg
4. Measurement uncertainties in science and technology – Michael Grabe, Springer

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

F.Y.B.Sc –SEMESTER-I

Vocational Skill Course (VSC)

(Practical related to major)

Course Code	Paper Title	Credit
VGVUSVSP104	**Basic Skills in Physics**	2

Course objectives:

On successful completion of this course students will be able to:

i) Handle different measuring instruments and learn how to take precise readings with them

ii) Make useful calculations using the measurements taken from different instruments

iii) Handle basic electric components and circuits without fear.

iv) Understand and measure different electrical parameters applicable to daily usage

v) Understand the concepts of errors and their estimation

vi) Develop skills for optical experiments

Sr. No	Title of Experiment
1.	Use of Vernier calipers
2.	Micrometer Screw Gauge
3.	Travelling Microscope
4.	Graph Plotting: Experimental, Straight Line with intercept, Resonance Curve etc.
5.	Spectrometer: Optical Leveling and Schuster's Method
6.	Use of DMM.
7.	Absolute and relative errors calculation.
8.	Focal length of lens by auto collimation.
9.	LASER beam divergence

All experiments are to be reported in a journal. Certified journal is must to be eligible to appear for the semester end practical.

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

FYBSC SEMESTER- II

Major/ Minor

Course Code	Paper Title	Credit
VGVUSMPH201	**Structure of Solids and X-rays**	2

Course objectives:

1. Students will learn the concept of origin of X-rays.
2. The students will learn the importance of X-rays.
3. To study the arrangements of atoms & molecules in solids.
4. To students will study the concept of packing efficiency of solids.

Unit	Content	No of Lectures
1	**Chapter 1: X-rays** 1.1 X-Rays production and properties. 1.2 Continuous and characteristic X-Ray spectra, 1.3 X-Ray Diffraction, 1.4 Bragg's Law 1.5 Applications of X-Rays – Industrial & Medical	**10**
2	**Chapter 2: Solid State Physics** 2.1 Lattice points and space lattice, 2.2 The basis and crystal structure, 2.3 Unit Cells and lattice parameters, 2.4 Primitive Cells, Crystal Systems, 2.5 Crystal Symmetry, Bravais space lattices 2.6 Metallic crystal structures, 2.7 Relation between the density of crystal material and lattice constant in a cubic lattice, 2.8 Directions, Planes, Miller Indices, 2.9 Important planes in simple cubic structure, 2.10 separation between lattice planes in a cubic crystal	10
3	**Chapter 3: Crystal Structure** 3.1 Study of S.C, B.C.C & F.C.C Crystal Structure 3.2 Study of Diamond Crystal Structure 3.3 Study of NaCl Crystal Structure 3.4 Study of HCP (Hexagonal Closed Packed) Crystal Structure 3.5 Determination of c/a ratio of HCP unit cell	10
Total Number of Lectures		30

Course Outcomes: Students should able to..

CO1	The students should be able to understand origin of X-rays.
CO2	The students will understand the importance applications of X-rays in various field.
CO3	To understand the arrangements of atoms & molecules in crystal.
CO4	To understand the concept of packing efficiency of crystal.

Reference:

1. BSS: N Subrahmanyam, Brijlal and Seshan, Atomic and Nuclear Physics Revised Ed. Reprint 2012, S. Chand
2. Arthur Beiser: Perspectives of Modern Physics : Tata McGraw Hill
3. Introduction to Solid State Physics: S. O. Pillai (New Age International)
4. Introduction to Solid State Physics: Babar & Puri (S.Chand Publication)

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

FYBSC SEMESTER- II

Major/ Minor

PHYSICS PRACTICAL

Course Code	Paper Title	Credit
VGVUSMPHP201	Structure of Solids and X-rays	2

Leaning Outcome:

i) To understand and practice the skills while doing physics practical.

ii) To understand the use of apparatus and their use without fear.

iii) To correlate physics theory concepts through practical.

iv) Understand the concepts of errors and their estimation.

A) Regular experiments:

Sr. No	**Name of Group - A**
1.	J by Electrical Method: To determine mechanical equivalent of heat (Radiation correction by graph method)
2.	LR Circuit: To determine the value of given inductance and phase angle
3.	CR Circuit: To determine value of given capacitor and Phase angle
4.	Frequency of AC Mains: To determine frequency of AC mains.
5.	LCR series Resonance: To determine resonance frequency of LCR series circuit.
6.	LDR Characteristics: To study the dependence of LDR resistance on intensity of light.
7.	De Sauty's capacitance bridge
	Name of Group - B
1	To study Zener Diode characteristics and its use as a voltage Regulator.
2	To study load regulation of a Bridge Rectifier with and without capacitor
3	To study NAND and NOR gates as Universal Building Blocks

4	To design and verify the EX-OR gate using NAND gate
5	To verify De Morgan's Theorems – using basic gates
6	Thevenin's Theorem: To verify Thevenin's theorem for DC circuits
7	To verify De Morgan's Theorems – using universal gates

C) Any one out of following is equivalent to two experiments from section A or B

1. Students should collect the information of at least five Physicists with theirwork. Report that in journal.
2. Students should carry out mini-project up to the satisfaction of professor In-charge of practical.
3. Study tour, students participated in study tour must submit a study tour report.

Note: Minimum 5 from each group and total 10 experiments should be completed in the second semester. All experiments are to be reported in a journal. Certified journal is must to be eligible to appear for the semester end practical

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

SEM ISTER – II

Open Elective

(For Arts & Commerce students)

Course Code	Paper Title	Credit
VGVUOE205	Fundamentals of Computer (Department Physics)	3

Course Objectives: To enable the students to

i) The Students will learn the various parts of Computer.

ii) The students will learn the different types of storage devices & various I/O devices

iii) The students will Know the Installation of operating system and software

iv) The students will study troubleshooting of Computer

v) The student will study how to atomization the MS- Office.

vi) To study the networking of Computers and the importance of anti-virus

Sr. No	Module No	Contains	Lectures
1	Unit-_I	**Chapter 1: Introduction :** 1.1Block Diagram 1.2 Types 1.3 Generation 1.4 Computer hardware & software **Chapter 2: Mother board components and their function:** **2.1**Types, I/O ports 2.2 BIOS, power supply 2.3Slots: Memory slots 2.4 Expansion slots 2.5Back panel 2.6 connectors: power 2.7 IDE, Memory and processor 2.8 CMOS battery	15
	Unit -III	**Chapter 3: Storage devices :** 3.1Primary and Auxiliary - types, functions, 3.2 Applications and their specifications **Chapter 4: Input / Output devices:** 4.1Keyboard	15

		4.2 Mouse, Monitor 4.3 Printers, Scanner 4.4 Plotter, Joystick 4.5 OMR etc	
3	**Unit -III**	**Chapter 5: PC Maintenance:** **5.1** Partitioning 5.2 Formatting 5.3 Installation of Operating System and Software, Use of anti-virus, Trouble shooting **Chapter 6: Networking:** Data Communication, types, Protocols, Cables, Maintenance and trouble shooting	**15**

Course outcome:

1. The students will understand the important blocks in computers.
2. The students will understand the importance of storage devices in computer.
3. The students will acquire the skill of Installation of operating system various software.
4. The students will identify the troubleshooting of Computer.
5. The students will understand the important of networking.

References:

4. **Computer Fundamentals** by P K Sinha.
5. **Computer Fundamentals** by Goel.
6. **Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications (Chapman & Hall/CRC Computer and Information Science Series)** by de Castro and Leandro Nunes.
7. **Fundamentals of computers** by E. Balagurusamy

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Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

SEM ISTERV – II

Open Elective

(For Arts & Commerce students)

Course Code	Paper Title	Credit
VGVUOE205	**Practical based Fundamentals of Computer** (Department Physics)	1

Title: Practical based Fundamentals of Computer (Practical)

Course Objectives: To enable the students to

1. Understand various parts and their functions of Computer
2. Understand different types of storage devices
3. Understand various I/O devices
4. Know the Installation of operating system and software
5. Understand troubleshooting of Computer
6. Make use of MS- Office for office atomization
7. Understand Networking of Computers

Sr No	Name of Experiments
1.	Study of various parts of Computer & their connections
2.	Study of Mother Board
3.	Study of Various Storage Devices
4.	Study of Keyboard, Mouse and Monitor
5.	Study of Printers and their installation
6.	Installation of operating system and software
7.	Antivirus Software use and its maintenance
8.	Troubleshooting of Computer
9.	Study and Application of MS Word
10.	Study and Application of MS Excel / Power Point

References:

1. " A First Course in **Computers**" by Sanjay Sexena.
2. " Programming in ANSI C" by Balaguruswamy.
3. " C Programming Language" by Brian W Kerighan and Dennis M Ritchie.
4. " **Introduction To Computers**" by Ms Shikha Nutiyal.
5. " **Introduction to** Information Technology" by Rajaraman V.

All experiments are to be reported in a journal. Certified journal is must to be eligible to appear for the semester end practical examination.

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

FYBSC SEMESTER- II

Skill Enhancement Course (SEC)

(For Physics students)

Course Code	Paper Title	Credit
VGVUSSE204	**Electricity and Electronics**	2

Course objectives: To enable students to

1. Apply principles of electricity and electronics.
2. To understand different types of circuits used in electronics and their applications
3. To study different components in electric circuits
4. Learn the methods of solving complex circuits

Sr. No.	Modules/Units	Lectures (30)
Unit I	**Chapter 1: Alternating current theory** 1.1 AC circuit containing pure R, pure L and pure C, 1.2 Representation of sinusoids by complex numbers, 1.3 Series L-R, C-R and LCR circuits. 1.4 Resonance in LCR circuit (both series and parallel), 1.5 Power in ac circuit. 1.6 Q-factor **Chapter 2: A. C Bridges** 2.1 AC-bridges: General AC bridge, 2.2 Maxwell, de-Sauty, 2.3 Wien Bridge 2.4 Hay Bridge.	**10**
Unit II	**Chapter 3: Circuit Theorem** 3.1 Voltage Divider, Current divider, 3.2 Ideal voltage source and ideal current source. 3.3 Superposition Theorem 3.4 Thevenin's Theorem 3.5 Norton's Theorem, Reciprocity Theorem, 3.6 Maximum Power Transfer Theorem. 3.7 Numericals related to circuit analysis using the above theorems.	**10**

	Chapter 4: DC power supply 4.1 Half wave rectifier & Full wave rectifier, 4.2 Bridge rectifier, 4.3 Peak inverse voltage and Ripple factor of full wave rectifier, 4.4 Clipper and Clampers(Basic circuits only), 4.5 Capacitor Filter. 4.6 Zener diode as voltage stabilizer	
Unit III	**Chapter 5: Bipolar Junction Transistors** 5.1 Introduction to BJT: symbols and operation 5.2 BJT Circuit configurations 5.3 Current gain of BJT in CB, CE and CC configuration 5.4 Input and output characteristics in CB, CE configuration **Chapter 6: Digital Electronics** 6.1 Logic gates (Review), NAND and NOR as universal building block 6.2 EXOR gate: logic expression, logic symbol, truth table 6.3 Implementation using basic gates and its applications, 6.4 Boolean algebra, Boolean theorems. 6.5 De-Morgan theorems, Half adder and Full adder	**10**

Course outcomes:

CO1	The students should be able to understand circuits utilising AC current
CO2	The students will understand circuit theorems and be able to make calculations to simplify complex circuits
CO3	To understand the DC power supply and methods to achieve it
CO4	To understand logic gates, circuits based on logic gates

References :

1. CR: D. Chattopadhyay, P C Rakshit , Electricity and Magnetism 7th Ed. New Central Book agency.
2. TT :B.L. Theraja and A.K. Theraja , A Textbook of Electrical Technology Vol. I , S. Chand Publication
3. BN :Boylestad and Nashelsky, Electronic devices and Circuit Theory: 7th edition, Prentice Hall of India.
4. VKM: V K Mehta and R Mehta Electronics Principals, MulticolouredRevised 11th

Ed. reprint in 2012 ,S Chand.

5. A P Malvino, Digital Principles and Applications: Tata McGraw Hill
6. Tokhiem, Digital electronics, 4thed, McGraw Hill International Edition.

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Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

FYBSC SEMESTER- II

Skill Enhancement Course (SEC)

(For Physics students)

Course Code	Paper Title	Credit
VGVUSVSP104	**Advanced Skills in Physics**	2

Advance Technics in Physics (VSC) (Practical)

1.	Use of Bread board (Transistor as switch, Bridge rectifier)
2.	Use of Bread board (Logical circuits: EX-NOR gate)
3.	Use of Oscilloscope to measure frequency &voltage
5.	Charging and discharging of a capacitor
6.	Use of LDR as a Light dependent switch
7.	Use of PC for graph plotting
8.	Clipper and Clamper circuits.
9.	Thermocouple as temperature sensor
10.	Application of LM35 in temperature measurement
11	Transistor characteristics
12	TTL as AND,OR,NOT, NAND and NOR

Note: All experiments are to be reported in a journal. Certified journal is must to be eligible to appear for the semester end practical.

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Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

Evaluation Pattern:

1. All examinations will be conducted by the college. Each paper carries 100 marks in the 60-40 pattern i.e. 60 marks for semester end examination and 40 marks for internal/continuous assessment and or project. The combine passing 40%. Minimum 20% marks must be secured from external as well as internal semester end examination.
2. In each semester, the student will have to submit a Project/Assignment/Journal for theory papers in the College before appearing for the Semester End Examination. The last date of submission of the Project will be officially declared by the College.
3. The Project work will be carried out by the student with the guidance of the concerned Faculty Member who will be allotted to the student as the Guide for the Project.
4. The practical examination will be conducted at the end of the semester. The examination will be of 100 marks per paper and minimum marks for passing will be 40%.

The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)

Theory Examination Pattern for

(Major/ Minor and VSC/SEC/ Open Elective)

1.	**Internal Assessment Theory Paper**	**40 Marks**
1. 2.	One class test (Short answers/Objectives/ Multiple Choice) Assignment/ Project/ Presentation/Book or research paper Review Active Participation, Overall performance	15 Marks 15 Marks 10 Marks
2	**Semester End Examination: Question Paper format for Theory Paper**	**60 Marks**
		Time:2hr
	N.B. 1. All questions are compulsory 2. All questions carry equal marks. 3. Use of non-programmable calculators and logarithmic tables is allowed. 4. Figures to the right hand indicate full marks.	
Q1.	Unit-I	15
Q2.	Unit-II	15
Q3.	Unit-III	15
Q4.	Unit-I,II &III	15
1.	**Internal Assessment Theory Paper**	**40 Marks**
1. 2.	One class test (Short answers/Objectives/ Multiple Choice) Assignment/ Project/ Presentation/Book or research paper Review Active Participation, Overall performance	15 Marks 15 Marks 10 Marks
2	**Semester End Examination: Question Paper format for Theory Paper**	**60 Marks**
		Time:2hr
	N.B. 1. All questions are compulsory 2. All questions carry equal marks. 3. Use of non-programmable calculators and logarithmic tables is	

	allowed. 4. Figures to the right hand indicate full marks.	
Q1.	Unit-I	15
Q2.	Unit-II	15
Q3.	Unit-III	15
Q4.	Unit-I,II &III	15

	External Assessment for Practical	**100 Marks**
	Experiment –I Experiment –II Viva Journal	**40** **40** **10** **10**
	Total Marks	**100**

Practical Examination

There will be two groups of experiments and student will have to perform minimum 5 experiments from each group. Minimum 10 experiments should be reported in journal in SEM-I and SEM-II

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Practical Examination Pattern for Open Elective

	External Assessment for Practical	**40 Marks**
	Experiment –I	**20**
	Viva	**10**
	Journal	**10**
	Total Marks	**40**