VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)

Department of Electronics

Departmental Teaching and Evaluation scheme

Three/Four- Years UG Programme

Department/Subject Specific Core or Major (DSC)

(as per NEP-2020 Guidelines)

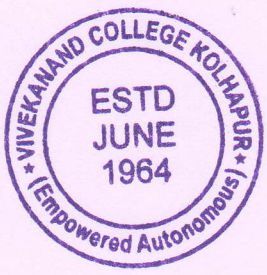
First Year Semester-I & II

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-I										
1	DSC-I	DSC03ELE11	Analog Electronics-I	2	-	40	10	-	50	2
2	DSC-II	DSC03ELE12	Digital Electronics-I	2	-	40	10	-	50	2
3	MIN-I	MIN03ELE11	Analog Electronics-I	2	-	40	10	-	50	2
4	MIN-II	MIN03ELE12	Digital Electronics-I	2	-	40	10	-	50	2
5	OEC-I	OEC03ELE11	Circuit Fundamentals-I	2	-	40	10	-	50	2
6	OEC-II	OEC03ELE12	Semiconductor Devices	2	-	40	10	-	50	2
7	IKS-I	IKS03GEC11	Indian Knowledge System	2	-	25	-	-	25	2
8	DSC-PR-I	DSC03ELE19	DSC Electronics Lab-1	-	4	-	-	25	25	2
9	MIN-PR-I	MIN03ELE19	MIN Electronics Lab-1	-	4	-	-	25	25	2
10	OEC-PR-I	OEC03ELE19	OEC Electronics Lab-1	-	4	-	-	25	25	2
Semester –I Total				**14**	**12**	**265**	**60**	**75**	**400**	**20**
Semester-II										
1	DSC-III	DSC03ELE21	Analog Electronics-II	2	-	40	10	-	50	2
2	DSC-IV	DSC03ELE22	Digital Electronics-II	2	-	40	10	-	50	2
3	MIN-III	MIN03ELE21	Analog Electronics-II	2	-	40	10	-	50	2
4	MIN-IV	MIN03ELE22	Digital Electronics-II	2	-	40	10	-	50	2
5	OEC-III	OEC03ELE21	Circuit Fundamentals-II	2	-	40	10	-	50	2
6	OEC-IV	OEC03ELE22	Semiconductor Devices and Circuits	2	-	40	10	-	50	2
7	VSC-PR-I	VSC03ELE29	Circuit simulation Lab	-	4	-	-	25	25	2
8	DSC-PR-II	DSC03ELE29	DSC Electronics Lab-2	-	4	-	-	25	25	2
9	MIN-PR-II	MIN03ELE29	MIN Electronics Lab-2	-	4	-	-	25	25	2
10	OEC-PR-II	OEC03ELE29	OEC Electronics Lab-2	-	4	-	-	25	25	2
Semester –II Total				**12**	**16**	**240**	**60**	**100**	**400**	**20**

Departmental Teaching and Evaluation scheme

Second Year Semester-III & IV

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-III										
1	DSC-V	DSC03ELE31	Electronic Communication	2	-	40	10	-	50	2
2	DSC-VI	DSC03ELE32	Microprocessor 8085	2	-	40	10	-	50	2
3	MIN-V	MIN03ELE31	Microprocessor 8085	2	-	40	10	-	50	2
4	MIN-VI	MIN03ELE32	8051 Microcontroller Interfacing and Embedded C	2	-	40	10	-	50	2
5	VSC-PR-II	VSC03ELE39	PCB Designing Lab	-	4	-	-	25	25	2
6	DSC-PR-III	DSC03ELE39	DSC-Electronics Lab-3	-	8	-	-	50	50	4
7	MIN-PR-III	MIN03ELE39	MIN-Electronics Lab-3	-	4	-	-	25	25	2
Semester –III Total				**8**	**16**	**160**	**40**	**100**	**300**	**16**
Semester-IV										
1	DSC-VII	DSC03ELE41	Operational Amplifier	2	-	40	10	-	50	2
2	DSC-VIII	DSC03ELE42	Microcontroller 8051	2	-	40	10	-	50	2
3	MIN-VII	MIN03ELE41	Microcontroller 8051	2	-	40	10	-	50	2
4	MIN-VIII	MIN03ELE42	Internet of Things (IoT)	2	-	40	10	-	50	2
5	VSC-PR-III	VSC03ELE49	Electrical Wiring Lab	-	4	-	-	25	25	2
6	DSC-PR-IV	DSC03ELE49	DSC-Electronics Lab-4	-	8	-	-	50	50	4
7	MIN-PR-IV	MIN03ELE49	MIN-Electronics Lab-4	-	4	-	-	25	25	2
Semester –IV Total				**8**	**16**	**160**	**40**	**100**	**300**	**16**



Departmental Teaching and Evaluation scheme

Third Year Semester-V & VI

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-V										
1	DSC-IX	DSC03ELE51	Fundamentals of Instrumentation	2	-	40	10	-	50	2
2	DSC-X	DSC03ELE52	8051 Microcontroller Interfacing and Embedded C	2	-	40	10	-	50	2
3	DSC-XI	DSC03ELE53	Antenna and Wave Propagation	2	-	40	10	-	50	2
4	DSC-XII	DSC03ELE54	Programmable Logic Controller(PLC)	2	-	40	10	-	50	2
5	DSE-I	DSE03ELE51	Computer Networks	2	-	40	10	-	50	2
6	VSC-PR-IV	VSC03ELE59	Solar systems Lab	-	4	-	-	25	25	2
7	FP	FPR03ELE51	Field Project		4			50	50	2
8	DSC-PR-V	DSC03ELE59	DSC Electronics Lab-5	-	16	-	-	100	100	8
Semester –V Total				**10**	**24**	**200**	**50**	**175**	**425**	**22**
Semester-VI										
1	DSC-XIII	DSC03ELE61	Industrial Instrumentation	2	-	40	10	-	50	2
2	DSC-XIV	DSC03ELE62	Advanced Microcontroller	2	-	40	10	-	50	2
3	DSC-XV	DSC03ELE63	Power Electronics	2	-	40	10	-	50	2
4	DSC-XVI	DSC03ELE64	Internet of Things (IoT)	2	-	40	10	-	50	2
5	DSE-II	DSE03ELE61	FPGA & VHDL Programming	2	-	40	10	-	50	2
6	VSC-PR-V	VSC03ELE69	IoT Lab	-	4	-	-	25	25	2
7	OJT	OJT03ELE61	On Job Training		4			50	50	2
8	DSC-PR-VI	DSC03ELE69	DSC Electronics Lab-6	-	16	-	-	100	100	8
Semester –VI Total				**10**	**24**	**200**	**50**	**175**	**425**	**22**

Abbreviations: TH-Theory, PR-Practical, PRO- Project, ESE- End Semester Examination, CIE-Continuous Internal Examination

Note:
- Minimum passing for 10 marks Internal evaluation = 04 marks
- Minimum passing for 40 marks Theory paper = 16 marks
- Minimum passing for 25 marks Practical = 10 marks
- Minimum passing for 50 marks Practical/FP/OJT = 20 marks
- Minimum passing for 100 marks Practical/FP = 40 marks

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

Passing percentage for Democracy, Election and Good Governance (DEGG) and Environmental Studies papers should be 40%

Separate passing for each Head - ESE, CIE and Practicals

Vivekanand College, Kolhapur (Empowered Autonomous)
Department of Electronics
Credit Framework under Three/Four- Years UG Programme
Department/Subject Specific Core or Major (DSC)

Level	Semester	1-Major		2-Minor	3-OE	4-VSC/SEC	5-AEC, VEC, IKS			6-OJT, FP, CEP, CC, RP				
		Major		Minor	IDC/MDC/ OE/GE	VSEC	AEC (Language)	Value Education Courses (VEC)	IKS	CC	CEP/ FP	OJT	RP	Total Credits
		DSC	DSE	MIN	OEC									
4.5	I	DSC-I (2) Analog Electronics-I DSC-II (2) Digital Electronics-I DSC Electronics Lab-1 (2)		MIN-I (2) Analog Electronics-I MIN-II (2) Digital Electronics-I MIN Electronics Lab-1 (2)	OEC-I (2) Circuit Fundamentals-I OEC-II (2) Semiconductor Devices OEC Electronics Lab-1 (2)		AEC-I (2) English	-	IKS (2) Introduction to IKS				-	
	Credits	4+2=6		4+2=6	4+2=6		2		2				-	22
	II	DSC-III (2) Analog Electronics-II DSC-IV (2) Digital Electronics-II DSC Electronics Lab-2 (2)		MIN-III (2) Analog Electronics-II MIN-IV (2) Digital Electronics-II MIN Electronics Lab-2 (2)	OEC-III (2) Circuit Fundamentals-II OEC-IV (2) Semiconductor Devices and Circuits OEC Electronics Lab-2 (2)	VSC-I (2) Circuit simulation Lab	AEC-II (2) English						-	
	Credits	4+2=6		4+2=6	4+2=6	2	2						-	22
1st year Cumulative Credits		12		12	12	2	4		2					44
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor														
5.0	III	DSC-V (2) Electronic Communication DSC-VI (2) Microprocessor 8085 DSC Electronics Lab-3 (4)		MIN-V (2) Microprocessor 8085 MIN Electronics Lab-3 (2)		VSC-II (2) Solar Systems Lab VSC-III (2) Electric Wiring Lab	AEC-III (2) English	VEC- I (2) Democracy VEC-II (2) Environmental Science						
	Credits	4+4=8		2+2=4		4	2	4					-	22
	IV	DSC-VII (2) Operational Amplifier DSC-VIII (2) Microcontroller 8051 DSC Electronics Lab-4 (4)		MIN-VI (2) Microcontroller 8051 MIN Electronics Lab- 4 (2)		VSC-IV (2) PCB designing Lab VSC-V (2) IoT Lab	AEC-IV (2) English	VEC-III (2) Environmental Science		CC (2)				
	Credits	4+4=8		2+2=4		4	2	2		2			-	22
2nd year Cumulative Credits		16		8		8	4	6		2				44
Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor														

5.5	V	DSC-IX (2) Fundamentals of Instrumentation DSC-X (2) 8051 Microcontroller Interfacing and Embedded C DSC-XI (2) Antenna and Wave Propagation DSC-XII (2) Programmable Logic Controller(PLC) DSC Electronics Lab-5 (8)	DSE- I (2) Computer Networks	MIN-VII(2) 8051 Microcontroller Interfacing and Embedded C	-			-		-	FP (2)		-	
	Credits	8+8=16	2+0=2	2 +0=2				-			2			22
	VI	DSC- XIII (2) Industrial Instrumentation DSC- XIV (2) Advanced Microcontroller DSC- XV (2) Power Electronics DSC- XVI (2) Internet of Things (IoT) DSC Electronics Lab-6 (8)	DSE-II (2) FPGA & VHDL Programming	MIN-VIII (2) Internet of Things (IoT)	-			-		-		OJT (2)	-	
	Credits	8+8=16	2+0=2	2 +0=2				-				2		22
3rd year Cumulative Credits		32	4	4							2	2		44
3-years Cumulative Credits		60/48 DSC	4 DSE	24/24 Minor	12/9 IDC/MDC/OE/GE	10/9 VSC	8/8 AEC	6/6 VEC	2/2 IKS	2/2 CC	2/2 CEP/ FP	2/2 OJT	-	132/ 132
Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor														
6.0	VII	DSC-XVII (4) DSC-XVIII (4) DSC Practical-IV (2) DSC Practical-IV (2) DSC Practical-IV (2)	DSE-III (4)	Research Methodology (4)										
	Credits	8+6=14	4+0=4	4+0=4										22
	VIII	DSC-XIX (4) DSC-XX (4) DSC Practical-IV (2) DSC Practical-IV (2) DSC Practical-IV (2)	DSE-IV (4)								FP (2)	OJT (2)		
	Credits	8+6=14	4+0=4								2	2		22
	Cu. Cre	28	8	4							2	2		44
4-years Cumulative Credits		88/78 DSC	12 DSE	28/24 Minor	12/9 IDC/MDC/OE/GE	10/9 VSC	8/8 AEC	6/6 VEC	2/2 IKS	2/2 CC	4/4 FP	4/4 OJT	-	176/176
Four Year UG Honours Degree in Major and Minor with 176 credits														

6.0	VII	DSC-XVII (4) DSC-XVIII (4) DSC Practical-IV (2)	DSE-III (4)	Research Methodology (4)									RP(4)		
	Credits	8+2=10	4+0=4	4+0=4									4	22	
	VII	DSC-XIX (4) DSC-XX (4) DSC Practical-IV (2)	DSE-IV (4)										RP(8)		
	Credits	8+2=10	4+0=4	0									8	22	
	Cu. Cre	20	8	4									12	44	
4-years Cumulative Credits		80/80	12	28/24 Minor	12/9 IDC/MDC/OE/GE	10/9 VSC	8/8 AEC	6/6 VEC	2/2 IKS	2/2 CC	4/4 CEP/ FP	4/4 OJT	12 RP	176/ 176	

Four Year UG Honours with Research Degree in Major and Minor with 176 credits

Abbr:

DSC	: Department Specific Core
DSE	: Department Specific Elective
MIN	: Minor
OE	: Open Elective
IDC	: Inter-Disciplinary Course
MDC	: Multi-Disciplinary Course
GE	: Generic Elective
OEC	: Open Elective Course
VSC	: Vocational Skill Course
SEC	: Skill Enhancement Course
VSEC	: Vocational/Skill Enhancement Course
AEC	: Ability Enhancement Course
VEC	: Value Education Course
IKS	: Indian Knowledge System
CC	: Co-curricular Courses
CEP	: Community Engagement Programme
FP	: Field Project
OJT	: On-Job Training (Internship/Apprenticeship)
RP	: Research Project

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

CHAIRMAN
BoS ELECTRONICS
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)

Department of Electronics

Teaching and Evaluation scheme

Three/Four- Years UG Programme

Department/Subject Specific Core or Major (DSC)

(as per NEP-2020 Guidelines)

First Year Semester-I & II

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks[1]				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-I										
1	DSC-I	DSC03ELE11	Analog Electronics-I	2	-	40	10	-	50	2
2	DSC-II	DSC03ELE12	Digital Electronics-I	2	-	40	10	-	50	2
3	MIN-I	MIN03ELE11	Analog Electronics-I	2	-	40	10	-	50	2
4	MIN-II	MIN03ELE12	Digital Electronics-I	2	-	40	10	-	50	2
5	OEC-I	OEC03ELE11	Circuit Fundamentals-I	2	-	40	10	-	50	2
6	OEC-II	OEC03ELE12	Semiconductor Devices	2	-	40	10	-	50	2
7	IKS-I	IKS03GEC11	Indian Knowledge System	2	-	25	-	-	25	2
8	DSC-PR-I	DSC03ELE19	DSC Electronics Lab-1	-	4	-	-	25	25	2
9	MIN-PR-I	MIN03ELE19	MIN Electronics Lab-1	-	4	-	-	25	25	2
10	OEC-PR-I	OEC03ELE19	OEC Electronics Lab-1	-	4	-	-	25	25	2
Semester –I Total				**14**	**12**	**265**	**60**	**75**	**400**	**20**
Semester-II										
1	DSC-III	DSC03ELE21	Analog Electronics-II	2	-	40	10	-	50	2
2	DSC-IV	DSC03ELE22	Digital Electronics-II	2	-	40	10	-	50	2
3	MIN-III	MIN03ELE21	Analog Electronics-II	2	-	40	10	-	50	2
4	MIN-IV	MIN03ELE22	Digital Electronics-II	2	-	40	10	-	50	2
5	OEC-III	OEC03ELE21	Circuit Fundamentals-II	2	-	40	10	-	50	2
6	OEC-IV	OEC03ELE22	Semiconductor Devices and Circuits	2	-	40	10	-	50	2
7	VSC-I	VSC03ELE21	Circuit simulation Lab	-	4	-	-	25	25	2
8	DSC-PR-II	DSC03ELE29	DSC Electronics Lab-2	-	4	-	-	25	25	2
9	MIN-PR-II	MIN03ELE29	MIN Electronics Lab-2	-	4	-	-	25	25	2
10	OEC-PR-II	OEC03ELE29	OEC Electronics Lab-2	-	4	-	-	25	25	2
Semester –II Total				**12**	**16**	**240**	**60**	**100**	**400**	**20**

Teaching and Evaluation scheme

Second Year Semester-III & IV

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-III										
1	DSC-V	DSC03ELE31	Electronic Communication	2	-	40	10	-	50	2
2	DSC-VI	DSC03ELE32	Microprocessor 8085	2	-	40	10	-	50	2
3	MIN-V	MIN03ELE31	Microprocessor 8085	2	-	40	10	-	50	2
4	VSC-II	VSC03ELE31	Solar systems Lab	-	4	-	-	25	25	2
5	VSC-III	VSC03ELE32	Electrical Wiring Lab	-	4	-	-	25	25	2
6	DSC-PR-III	DSC03ELE39	DSC-Electronics Lab-3	-	8	-	-	50	50	4
7	MIN-PR-III	MIN03ELE39	MIN-Electronics Lab-3	-	4	-	-	25	25	2
Semester –III Total				**6**	**20**	**120**	**30**	**125**	**275**	**16**
Semester-IV										
1	DSC-VII	DSC03ELE41	Operational Amplifier	2	-	40	10	-	50	2
2	DSC-VIII	DSC03ELE42	Microcontroller 8051	2	-	40	10	-	50	2
3	MIN-VI	MIN03ELE41	Microcontroller 8051	2	-	40	10	-	50	2
4	VSC-IV	VSC03ELE41	PCB Designing Lab	-	4	-	-	25	25	2
5	VSC-V	VSC03ELE42	IoT Lab	-	4	-	-	25	25	2
6	DSC-PR-IV	DSC03ELE49	DSC-Electronics Lab-4	-	8	-	-	50	50	4
7	MIN-PR-IV	MIN03ELE49	MIN-Electronics Lab-4	-	4	-	-	25	25	2
Semester –IV Total				**6**	**20**	**120**	**30**	**125**	**275**	**16**

Teaching and Evaluation scheme

Third Year Semester-V & VI

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-V										
1	DSC-IX	DSC03ELE51	Fundamentals of Instrumentation	2	-	40	10	-	50	2
2	DSC-X	DSC03ELE52	8051 Microcontroller Interfacing and Embedded C	2	-	40	10	-	50	2
3	DSC-XI	DSC03ELE53	Antenna and Wave Propagation	2	-	40	10	-	50	2
4	DSC-XII	DSC03ELE54	Programmable Logic Controller(PLC)	2	-	40	10	-	50	2
5	DSE-I	DSE03ELE51	Computer Networks	2	-	40	10	-	50	2
6	MIN-VII	MIN03ELE51	8051 Microcontroller Interfacing and Embedded C	2	-	40	10	-	50	2
7	FP	FPR03ELE51	Field Project		4			50	50	2
8	DSC-PR-V	DSC03ELE59	DSC Electronics Lab-5	-	16	-	-	100	100	8
Semester –V Total				**12**	**20**	**240**	**60**	**150**	**450**	**22**
Semester-VI										
1	DSC-XIII	DSC03ELE61	Industrial Instrumentation	2	-	40	10	-	50	2
2	DSC-XIV	DSC03ELE62	Advanced Microcontroller	2	-	40	10	-	50	2
3	DSC-XV	DSC03ELE63	Power Electronics	2	-	40	10	-	50	2
4	DSC-XVI	DSC03ELE64	Internet of Things (IoT)	2	-	40	10	-	50	2
5	DSE-II	DSE03ELE61	FPGA & VHDL Programming	2	-	40	10	-	50	2
6	MIN-VIII	MIN03ELE61	Internet of Things (IoT)	2	-	40	10	-	50	2
7	OJT	OJT03ELE61	On Job Training		4			50	50	2
8	DSC-PR-VI	DSC03ELE69	DSC Electronics Lab-6	-	16	-	-	100	100	8
Semester –VI Total				**12**	**20**	**240**	**60**	**150**	**450**	**22**

Abbreviations: TH-Theory, PR-Practical, PRO- Project, ESE- End Semester Examination, CIE-Continuous Internal Examination

Note:
Minimum passing for 10 marks Internal evaluation = 04 marks
Minimum passing for 40 marks Theory paper = 14 marks
Minimum passing for 25 marks Practical = 09 marks
Minimum passing for 50 marks Practical/FP/OJT = 18 marks
Minimum passing for 100 marks Practical/FP = 35 marks

Passing percentage for Democracy, Election and Good Governance (DEGG) and Environmental Studies papers should be 40%

Separate passing for each Head - ESE, CIE and Practicals

CHAIRMAN
BoS ELECTRONICS
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

VIVEKANAND COLLEGE KOLHAPUR (EMPOWERED AUTONOMOUS) ESTD JUNE 1964

"Dissemination of Education for Knowledge, Science and Culture"
-Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)

DEPARTMENT OF ELECTRONICS

Three/Four- Years UG Programme

Department/Subject Specific Core or Major (DSC)

Curriculum, Teaching and Evaluation Structure

(as per NEP-2020 Guidelines)

for

B.Sc.-I Electronics

Semester-I & II

(Implemented from academic year 2023-24 onwards)

VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)

Department of Electronics

B.Sc.: Program Outcomes (POs):

PO1: Disciplinary Knowledge: Graduates will gain in-depth understanding in their specific major or discipline, mastering the foundational principles and theories, as well as advanced concepts. Execute strong theoretical and practical understanding develoed from the specific programme in the area of work.

PO2:Problem-Solving Skills: Graduates will learn to use their knowledge to identify, analyze, and solve problems related to their field of study.

PO3:Analytical Skills: Graduates will gain the ability to collect, analyze, interpret, and apply data in a variety of contexts. They might also learn to use specialized software or equipment.

PO4:Research Skills and Scientific temper: Depending on the field, graduates might learn how to design and conduct experiments or studies, analyze results, and draw conclusions. They might also learn to review and understand academic literature.

PO5:Communication Skills: Many programs emphasize the ability to communicate effectively, both orally and in writing. Graduates may learn to present complex information clearly and succinctly, write detailed reports, and collaborate effectively with others.

PO6:Ethics and Professionalism: Graduates may learn about the ethical and professional standards in their field, and how to apply them in real-world situations.

B.Sc. in Electronics: Program Specific Outcomes (PSOs):

PSO1: Apply foundational knowledge: Apply the fundamental principles and concepts of electronics to analyze and solve problems in electronic circuits, devices, and systems.

PSO2: Design and analyze electronic systems: Design and analyze electronic circuits, systems, and components to meet specific requirements, considering factors such as performance, reliability, cost, and sustainability.

PSO3: Implement and troubleshoot electronic circuits: Demonstrate proficiency in implementing electronic circuits, including the selection and use of appropriate components, tools, and techniques, and effectively troubleshoot and debug electronic systems.

PSO4: Utilize modern tools and techniques: Utilize modern software tools, simulation techniques, and laboratory equipment to design, analyze, and test electronic circuits and systems.

PSO5: Adapt to emerging technologies: Adapt to and keep pace with emerging technologies in the field of electronics, demonstrating an understanding of their applications, limitations, and implications.

VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)

Department of Electronics

Teaching and Evaluation scheme

Three/Four- Years UG Programme

Department/Subject Specific Core or Major (DSC)

First Year Semester- I & II

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-I										
1	DSC-I	DSC03ELE11	Analog Electronics-I	2	-	40	10	-	50	2
2	DSC-II	DSC03ELE12	Digital Electronics-I	2	-	40	10	-	50	2
3	MIN-I	MIN03ELE11	Analog Electronics-I	2	-	40	10	-	50	2
4	MIN-II	MIN03ELE12	Digital Electronics-I	2	-	40	10	-	50	2
5	OEC-I	OEC03ELE11	Circuit Fundamentals-I	2	-	40	10	-	50	2
6	OEC-II	OEC03ELE12	Semiconductor Devices	2	-	40	10	-	50	2
7	IKS-I	IKS03GEC11	Indian Knowledge System	2	-	25	-	-	25	2
8	DSC-PR-I	DSC03ELE19	DSC Electronics Lab-1	-	4	-	-	25	25	2
9	MIN-PR-I	MIN03ELE19	MIN Electronics Lab-1	-	4	-	-	25	25	2
10	OEC-PR-I	OEC03ELE19	OEC Electronics Lab-1	-	4	-	-	25	25	2
Semester –I Total				**14**	**12**	**265**	**60**	**75**	**400**	**20**
Semester-II										
1	DSC-III	DSC03ELE21	Analog Electronics-II	2	-	40	10	-	50	2
2	DSC-IV	DSC03ELE22	Digital Electronics-II	2	-	40	10	-	50	2
3	MIN-III	MIN03ELE21	Analog Electronics-II	2	-	40	10	-	50	2
4	MIN-IV	MIN03ELE22	Digital Electronics-II	2	-	40	10	-	50	2
5	OEC-III	OEC03ELE21	Circuit Fundamentals-II	2	-	40	10	-	50	2
6	OEC-IV	OEC03ELE22	Semiconductor Devices and Circuits	2	-	40	10	-	50	2
7	VSC-I	SEC03ELE21	Circuit simulation Lab	-	4	-	-	25	25	2
8	DSC-PR-II	DSC03ELE29	DSC Electronics Lab-2	-	4	-	-	25	25	2
9	MIN-PR-II	MIN03ELE29	MIN Electronics Lab-2	-	4	-	-	25	25	2
10	OEC-PR-II	OEC03ELE29	OEC Electronics Lab-2	-	4	-	-	25	25	2
Semester –II Total				**12**	**16**	**240**	**60**	**100**	**400**	**20**

B. Sc. Part – I Semester -I ELECTRONICS

DSC-I: DSC03ELE11: ANALOG ELECTRONICS-I

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Identify and explain electrical components and determine the value of resistor, inductor and capacitor using color code method.

CO2: Understand the basic properties of electrical elements, and solve DC circuit analysis problems, DC network theorems.

CO3: Acquire the knowledge about the characteristics and working principles of PN junction diode, Zener diode, photo diode, LED and different diode applications.

CO4: Understanding and study of rectifier, filter and voltage regulator circuits.

Unit -1: Basic Circuit Elements: **(7Lectures.)**

Study of basic circuit elements and passive components: Resistor, Capacitor, Inductor, Transformer, Relays, Switches (working principle, circuit symbols, types, specifications and applications).

Unit -2: Circuit Analysis: **(8 Lectures.)**

Concept of Voltage and Current Sources, Internal resistance, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Mesh Analysis, Node Analysis, Principle of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Millman's Theorem, (Numericals expected)

Unit -3: PN Junction Diode: **(7 Lectures.)**

Construction of PN junction, Formation of Depletion Layer, Barrier potential, Forward and Reverse bias, Diode Equation and I-V characteristics, Zener diode, Zener and Avalanche breakdown, Zener diode specifications. Photo diode. Light Emitting Diode (LED): construction and working, 7-segment display and it's applications.

Unit-4: DC Power Supply: **(8 Lectures.)**

Need of Power Supply, Block diagram of DC regulated power supply, Rectifiers: Half wave, Full wave rectifiers (center tapped and bridge):- Circuit diagrams, working and waveforms, ripple factor, PIV, efficiency and TUF. Filter-Shunt capacitor filter, Series inductor filter, π - filter. Regulation: Concept of Line and load regulation, Zener diode as voltage regulator, Three pin IC regulators: Block diagram, Specifications and applications. Fixed and Variable voltage IC regulator (IC 78xx,79xx and LM317). Concept of SMPS.

Reference Books:

- Basic Electronic, B. Grob, McGraw Hill, 8th Edition (1997)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S.C. Gupta, Tata McGraw Hill, 1st edition (2008)
- Principles of Electronics - V. K. Mehta, Rohit Mehta S. Chand Publications, 11th edition (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication, 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st Edition(2011).

B. Sc. Part – I Semester -I ELECTRONICS
DSC-II: DSC03ELE12: DIGITAL ELECTRONICS-I
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understanding the basics of Digital Electronics, different number systems, Binary Codes and signed representation of binary number. Also understand the conversion between different number systems and solve the binary arithmetic problems.

CO2: Design and construction of the basic and universal logic gates and studying the Boolean algebra and simplification of Boolean expression using different methods.

CO3: Understanding and comparing different logic families according IC specifications and their circuit configurations.

CO4: Understand, analyze and design various combinational circuits.

Unit-1: Number System, Binary Codes and Binary Arithmetic: **(7 Lectures.)**

Decimal, Binary, Octal and Hexadecimal number systems and their inter conversions, BCD code, ASCII code, Gray Code, Excess-3 Code, Binary Arithmetic: Addition, Subtraction by 1's complement and2's complement method, Representation of signed and unsigned numbers,

Unit-2: Logic Gates, Boolean algebra: **(8 Lectures)**

Study of logic Gates: OR, AND, NOT, NOR, NAND,XOR, XNOR, Universal Gates, Boolean identities and Law's, fundamental theorems of Boolean algebra. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP).

Arithmetic Circuits: Binary Addition, Half and Full Adder, Half and Full Subtractor, 4-bit binary Adder/Subtractor.

Unit- 3: Logic Families **(7 Lectures)**

Logic Families: Types of Logic Families, Characteristics of Logic Families, TTL NAND gate, TTL NOR gate, TTL NOT gate, Concept of Tristate Logic, MOS Technology, CMOS: NOR, NAND and NOT gates, Comparison of TTL and CMOS logic families.

Unit-4: Combinational circuits: **(8 Lectures)**

Multiplexers: - 2 to 1, 4 to 1 and 8 to 1. Demultiplexers: - 1 to 2, 1 to 4, 1 to 8. Encoder: concept of encoder, Decimal to BCD Encoder. Basic Binary decoders: 2 to 4 line, 3 to 8 line and 4 to 16 line, BCD to decimal decoder, Study of BCD to seven-segment decoder driver IC 7447.

Reference books:

- Digital Fundamentals, T. L. Floyd, Pearson Education ,8th Edition (2009)
- Digital Principles and Applications, A. P. Malvino, D. P. Leach and Saha, McGraw-Hill Education (2011), 7th Edition (2011)
- Modern Digital Electronics, R. P. Jain, Fourth Edition, Tata McGraw-Hill Education, 4th Edition (2009).

B. Sc. Part – I Semester -I ELECTRONICS
DSC- PR-I : DSC03ELE19: DSC ELECTRONICS LAB-1
Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

ANALOG ELECTRONICS LAB (At least 7 experiments)

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), Digital Multimeter, Function Generator, power supplies and Oscilloscope etc.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope
3. Verification of Kirchhoff's Laws
4. Verification of Thevenin`s Theorem
5. Verification of Norton`s Theorem
6. Verification of Superposition Theorem
7. Study of the I-V Characteristics of P-N junction Diodes
8. Study of the a] breakdown Characteristics of Zener Diode
   b] Zener Diode as voltage regulator.
9. Study of Half wave and Full wave rectifier (centre tapped transformer /bridge)

DIGITAL ELECTRONICS LAB (At least 7 experiments)

1. Study of Logic Gates
2. Study of Universal NAND Gate
3. Study of Universal NOR Gate
4. Study of De-Morgans Theorems
5. Study of Half Adder and Full Adder
6. Study of Half and Full Subtractor
7. Study of BCD to seven segment Decoder
8. Study of Encoder
9. Study of Multiplexer (4:1) and Demultiplexer (1:4) using IC

B. Sc. Part – I Semester -II ELECTRONICS
DSC-III: DSC03ELE21: ANALOG ELECTRONICS-II
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Analyze output in different operating modes of Bipolar Junction Transistor and Demonstrate the operating principle and output characteristics of Bipolar Junction Transistor

CO2: Explain construction and characteristics of JFETs, MOSFETs and UJT.

CO3: Design biasing circuits for BJT and study different coupling methods used in multistage amplifiers

CO4: Analyze the importance of feedback in amplifiers. Apply the knowledge gained in the design of transistorized circuits and Oscillators.

Unit-1: Bipolar Junction Transistor: **(7 Lectures.)**

BJT: Introduction, Structure, Working of transistor. Transistor configurations: CB, CE and CC configurations, characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β. Relations between α and β, dc load line and Q point (Operating point), Significance of Q-point.

Unit-2: Unipolar Devices: **(7 Lectures.)**

JFET: Construction, working and I-V characteristics (output and transfer), MOSFET: Construction, working and I-V characteristics (output and transfer).UJT: introduction, structure and characteristics.

Unit-3 Amplifiers: **(8 Lectures.)**

Need of transistor Biasing, Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S., Class A, B, AB and C Amplifiers (Comparative Study on the basis of Q point),

Single stage CE amplifier: Current gain, Voltage gain, Power gain, input and output resistances, frequency Response.

Cascaded Amplifiers: Two stage RC, LC, TC and DC Coupled Amplifiers and their Frequency Responses, Concept of Differential amplifier and its advantages.

Unit-4: Feedback Amplifier and Oscillators: **(8 Lectures.)**

Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Oscillators: Barkhausen criterion for sustained oscillations. Phase shift, Wein Bridge, Hartley and Colpitt's oscillator .UJT as relaxation oscillator.

Reference Books:

- Principles of Electronics - V. K. Mehta, Rohit Mehta, S. Chand Publications, 11th edition (2008)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata McGraw Hill , 1st edition (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication , 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st edition (2011).
- Integrated Electronics, J. Millman & C. C. Halkias, 2nd edition, 2010, TMH.

B. Sc. Part – I Semester -II ELECTRONICS
DSC-IV: DSC03ELE22: DIGITAL ELECTRONICS -II
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand, analyze and design various sequential circuits.
CO2: Understanding the working of different shift registers and counters.
CO3: Became able to know various types of analog to digital converters and digital to analog converters.
CO4: Explain and compare the working of multivibrators using special application IC 555. Understanding and designing of multivibrator circuits.

Unit-1: Sequential Circuit: **(7 Lectures)**

Concept of Flip-flop, RS, D and JK Flip-Flops, Concept of Clock, Level and Edge Triggered RS,D, JKFF, Preset and Clear operations. Race-around conditions in JK Flip-Flop, Master- slave JK Flip-Flop, T-Flip-flop

Unit-2: Shift registers and Counters **(8 Lectures)**

Concept of register, Left shift and Right Shift operations, Types of shift registers: SISO, SIPO, PISO & PIPO (only up to 4 bits).

Counters: classification of counters, Asynchronous counters: 3 bit ripple counter, Decade Counter. Synchronous Counter: 3 bit and decade synchronous counter. Ring Counter and Johnson Counter, Applications of Counters

Unit-3: Data Converters **(7 Lectures)**

4 bit binary weighted and R-2R ladder network DAC: circuit and working. DAC Characteristics: Accuracy and Resolution. ADC: Flash, Counter type, successive approximation ADC, ADC Characteristics

Unit-4: Study of Timer IC 555 **(8 Lectures)**

IC555 timer: Introduction, Block diagram, Astable, Monostable and Bistable multivibrator circuits. Applications of IC555: PWM, square wave generator and FSK

Reference books:

- Digital design, Morris Mano, Prentice Hall of India, 4th Edition (2007).
- Digital Fundamentals, T. L. Floyd, Pearson Education , 8th Edition (2009)
- Digital Principles and Applications, A.P. Malvino, D. P. Leach and Saha, McGraw , 7th
- Edition (2011)
- Modern Digital Electronics, R.P. Jain, Tata McGraw-Hill Education, 4th Edition (2009).

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

B. Sc. Part – I Semester -II ELECTRONICS
DSC- PR-I : DSC03ELE29: DSC ELECTRONICS LAB-2
Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

ANALOG ELECTRONICS LAB (At least 7 experiments)

1. Study of I-V Characteristics of JFET
2. Study of Input, Output and transfer Characteristics of CE configuration of BJT
3. Study of Voltage divider bias circuit for CE mode
4. Transistor as a switch
5. Design of a Single Stage CE amplifier of given gain
6. Study of the RC Phase Shift Oscillator
7. Study of the Wein Bridge Oscillator
8. Study the Colpitt`s oscillator
9. Study the Hartley oscillator

DIGITAL ELECTRONICS LAB (At least 7 experiments)

1. Building and testing of RS Flip-Flop using NAND/NOR gate.
2. Building and testing D and JK Flip-Flop using IC
3. Construction and study of Shift Register (serial-in and serial-out) using D-type/ JK Flip-Flop ICs
4. Study of 3-bit Asynchronous counter
5. Study of 3-bit Flash ADC
6. Design and study of 4 bit digital to analog converter using R-2R ladder network.
7. Design and study of an Astable Multivibrator using IC 555 Timer.
8. Design and study of a Monostable Multivibrator using IC 555 Timer.
9. Design and study of a Bistable Multivibrator using IC 555 Timer.

B. Sc. Part – I Semester -I ELECTRONICS
MIN-I: MIN03ELE11: ANALOG ELECTRONICS-I
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Identify and explain electrical components and determine the value of resistor, inductor and capacitor using color code method.

CO2: Understand the basic properties of electrical elements, and solve DC circuit analysis problems, DC network theorems.

CO3: Acquire the knowledge about the characteristics and working principles of PN junction diode, Zener diode, photo diode, LED and different diode applications.

CO4: Understanding and study of rectifier, filter and voltage regulator circuits.

Unit -1: Basic Circuit Elements: **(7Lectures.)**

Study of basic circuit elements and passive components: Resistor, Capacitor, Inductor, Transformer, Relays, Switches (working principle, circuit symbols, types, specifications and applications).

Unit -2: Circuit Analysis: **(8 Lectures.)**

Concept of Voltage and Current Sources, Internal resistance, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Mesh Analysis, Node Analysis, Principle of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Millman's Theorem, (Numericals expected)

Unit -3: PN Junction Diode: **(7 Lectures.)**

Construction of PN junction, Formation of Depletion Layer, Barrier potential, Forward and Reverse bias, Diode Equation and I-V characteristics, Zener diode, Zener and Avalanche breakdown, Zener diode specifications. Photo diode. Light Emitting Diode (LED): construction and working, 7-segment display and it's applications.

Unit-4: DC Power Supply: **(8 Lectures.)**

Need of Power Supply, Block diagram of DC regulated power supply, Rectifiers: Half wave, Full wave rectifiers (center tapped and bridge):- Circuit diagrams, working and waveforms, ripple factor, PIV, efficiency and TUF. Filter-Shunt capacitor filter, Series inductor filter, π - filter. Regulation: Concept of Line and load regulation, Zener diode as voltage regulator, Three pin IC regulators: Block diagram, Specifications and applications. Fixed and Variable voltage IC regulator (IC 78xx,79xx and LM317). Concept of SMPS.

Reference Books:

- Basic Electronic, B. Grob, McGraw Hill, 8th Edition (1997)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S.C. Gupta, Tata McGraw Hill, 1st edition (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication, 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st Edition(2011).
- Principles of Electronics - V. K. Mehta, Rohit Mehta S. Chand Publications, 11th edition (2008)
- Electronic Devices and Circuits- J. Millman, C Halkias, S. Jit , McGraw Hill, 4th Edition (2015)

B. Sc. Part – I Semester -I ELECTRONICS
MIN -II: MIN03ELE12: DIGITAL ELECTRONICS-I
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understanding the basics of Digital Electronics, different number systems, Binary Codes and signed representation of binary number. Also understand the conversion between different number systems and solve the binary arithmetic problems.

CO2: Design and construction of the basic and universal logic gates and studying the Boolean algebra and simplification of Boolean expression using different methods.

CO3: Understanding and comparing different logic families according IC specifications and their circuit configurations.

CO4: Understand, analyze and design various combinational circuits.

Unit-1: Number System, Binary Codes and Binary Arithmetic: **(7 Lectures.)**

Decimal, Binary, Octal and Hexadecimal number systems and their inter conversions, BCD code, ASCII code, Gray Code, Excess-3 Code, Binary Arithmetic: Addition, Subtraction by 1's complement and2's complement method, Representation of signed and unsigned numbers,

Unit-2: Logic Gates, Boolean algebra: **(8 Lectures)**

Study of logic Gates: OR, AND, NOT, NOR, NAND,XOR, XNOR, Universal Gates, Boolean identities and Law's, fundamental theorems of Boolean algebra. Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP).

Arithmetic Circuits: Binary Addition, Half and Full Adder, Half and Full Subtractor, 4-bit binary Adder/Subtractor.

Unit- 3: Logic Families **(7 Lectures)**

Logic Families: Types of Logic Families, Characteristics of Logic Families, TTL NAND gate, TTL NOR gate, TTL NOT gate, Concept of Tristate Logic, MOS Technology, CMOS: NOR, NAND and NOT gates, Comparison of TTL and CMOS logic families.

Unit-4: Combinational circuits: **(8 Lectures)**

Multiplexers: - 2 to 1, 4 to 1 and 8 to 1. Demultiplexers: - 1 to 2, 1 to 4, 1 to 8. Encoder: concept of encoder, Decimal to BCD Encoder. Basic Binary decoders: 2 to 4 line, 3 to 8 line and 4 to 16 line, BCD to decimal decoder, Study of BCD to seven-segment decoder driver IC 7447.

Reference books:

- Digital Fundamentals, T. L. Floyd, Pearson Education ,8th Edition (2009)
- Digital Principles and Applications, A. P. Malvino, D. P. Leach and Saha, McGraw-Hill Education (2011), 7th Edition (2011)
- Modern Digital Electronics, R. P. Jain, Fourth Edition, Tata McGraw-Hill Education, 4th Edition (2009).

B. Sc. Part – I Semester -I ELECTRONICS
MIN-PR-I: MIN03ELE19: MIN ELECTRONICS LAB-1
Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

ANALOG ELECTRONICS LAB (At least 7 experiments)

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), Digital Multimeter, Function Generator, power supplies and Oscilloscope etc.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope
3. Verification of Kirchhoff's Laws
4. Verification of Thevenin`s Theorem
5. Verification of Norton`s Theorem
6. Verification of Superposition Theorem
7. Study of the I-V Characteristics of P-N junction Diodes
8. Study of Zener Diode a] breakdown Characteristics b] as voltage regulator.
9. Study of Half wave and Full wave rectifier (centre tapped transformer /bridge)

DIGITAL ELECTRONICS LAB (At least 7 experiments)

1. Study of Logic Gates
2. Study of Universal NAND Gate
3. Study of Universal NOR Gate
4. Study of De-Morgans Theorems
5. Study of Half Adder and Full Adder
6. Study of Half and Full Subtractor
7. Study of BCD to seven segment Decoder
8. Study of Encoder
9. Study of Multiplexer (4:1) and Demultiplexer (1:4) using IC

B. Sc. Part – I Semester -II ELECTRONICS

MIN -III: MIN03ELE21: ANALOG ELECTRONICS-II

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Analyze output in different operating modes of Bipolar Junction Transistor and Demonstrate the operating principle and output characteristics of Bipolar Junction Transistor

CO2: Explain construction and characteristics of JFETs, MOSFETs and UJT.

CO3: Design biasing circuits for BJT and study different coupling methods used in multistage amplifiers

CO4: Analyze the importance of feedback in amplifiers. Apply the knowledge gained in the design of transistorized circuits and Oscillators.

Unit-1: Bipolar Junction Transistor: **(7 Lectures.)**

BJT: Introduction, Structure, Working of transistor. Transistor configurations: CB, CE and CC configurations, characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β. Relations between α and β, dc load line and Q point (Operating point), Significance of Q-point.

Unit-2: Unipolar Devices: **(7 Lectures.)**

JFET: Construction, working and I-V characteristics (output and transfer), MOSFET: Construction, working and I-V characteristics (output and transfer).UJT: introduction, structure and characteristics.

Unit-3 Amplifiers: **(8 Lectures.)**

Need of transistor Biasing, Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S., Class A, B, AB and C Amplifiers (Comparative Study on the basis of Q point)

Single stage CE amplifier: Current gain, Voltage gain, Power gain, input and output resistances, frequency Response.

Cascaded Amplifiers: Two stage RC, LC, TC and DC Coupled Amplifiers and their Frequency Responses, Concept of Differential amplifier and its advantages

Unit-4: Feedback Amplifier and Oscillators: **(8 Lectures.)**

Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Oscillators: Barkhausen criterion for sustained oscillations. Phase shift, Wein Bridge, Hartley and Colpitt's oscillator,UJT as relaxation oscillator

Reference Books:

- Principles of Electronics - V. K. Mehta, Rohit Mehta S. Chand Publications, 11th edition (2008)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata McGraw Hill , 1st edition (2008)
- A text book of Applied Electronics- R. S. Sedha, S. Chand Publication , 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st edition (2011).

B. Sc. Part – I Semester -II ELECTRONICS
MIN -IV: MIN03ELE22: DIGITAL ELECTRONICS -II
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand, analyze and design various sequential circuits.
CO2: Understanding the working of different shift registers and counters.
CO3: Became able to know various types of analog to digital converters and digital to analog converters.
CO4: Explain and compare the working of multivibrators using special application IC 555. Understanding and designing of multivibrator circuits.

Unit-1: Sequential Circuit: **(7 Lectures)**

Concept of Flip-flop, RS, D and JK Flip-Flops, Concept of Clock, Level and Edge Triggered RS,D, JKFF, Preset and Clear operations. Race-around conditions in JK Flip-Flop, Master- slave JK Flip-Flop, T-Flip-flop

Unit-2: Shift registers and Counters **(8 Lectures)**

Concept of register, Left shift and Right Shift operations, Types of shift registers: SISO, SIPO, PISO & PIPO (only up to 4 bits).

Counters: classification of counters, Asynchronous counters: 3 bit ripple counter, Decade Counter. Synchronous Counter: 3 bit and decade synchronous counter. Ring Counter and Johnson Counter. Applications of Counters.

Unit-3: Data Converters **(7 Lectures)**

4 bit binary weighted and R-2R ladder network DAC: circuit and working. DAC Characteristics: Accuracy and Resolution. ADC: Flash, Counter type, successive approximation ADC, ADC Characteristics .

Unit-4: Study of Timer IC 555 **(8 Lectures)**

IC555 timer: Introduction, Block diagram, Astable, Monostable and Bistable multivibrator circuits. Applications of IC555: PWM, square wave generator and FSK.

Reference books:

- Digital design, Morris Mano, Prentice Hall of India, 4th Edition (2007).
- Digital Fundamentals, T. L. Floyd, Pearson Education , 8th Edition (2009)
- Digital Principles and Applications, A.P. Malvino, D. P. Leach and Saha, McGraw , 7th
- Edition (2011)
- Modern Digital Electronics, R.P. Jain, Tata McGraw-Hill Education, 4th Edition (2009).

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

B. Sc. Part – I Semester -II ELECTRONICS
MIN-PR-I: MIN03ELE29: MIN ELECTRONICS LAB-2
Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

ANALOG ELECTRONICS LAB (At least 7 experiments)

1. Study of I-V Characteristics of JFET
2. Study of Input, Output and transfer Characteristics of CE configuration of BJT
3. Study of Voltage divider bias circuit for CE mode
4. Transistor as a switch
5. Design of a Single Stage CE amplifier of given gain
6. Study of the RC Phase Shift Oscillator
7. Study of the Wein Bridge Oscillator
8. Study the Colpitt`s oscillator
9. Study the Hartley oscillator

DIGITAL ELECTRONICS LAB (At least 7 experiments)

1. Building and testing of RS Flip-Flop using NAND/NOR gate.
2. Building and testing D and JK Flip-Flop using IC
3. Construction and study of Shift Register (serial-in and serial-out) using D-type/ JK Flip-Flop ICs
4. Study of 3-bit Asynchronous counter
5. Study of 3-bit Flash ADC
6. Design and study of 4 bit digital to analog converter using R-2R ladder network.
7. Design and study of an Astable Multivibrator using IC 555 Timer.
8. Design and study of a Monostable Multivibrator using IC 555 Timer.
9. Design and study of a Bistable Multivibrator using IC 555 Timer.

B. Sc. Part – I Semester -I ELECTRONICS
OEC-I: OEC03ELE11: CIRCUIT FUNDAMENTALS-I
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand the fundamental concepts of electricity

CO2: Analyze DC resistive circuits involving series and parallel combinations of resistances

CO3: Understand Kirchhoff's laws, network theorems,

CO4: Understand AC fundamentals

Unit -1: Electricity: **(7Lectures)**

Introduction, Electric current, Electrical resistance, conductance and conductivity, open and short circuit, Direct Current, Alternating current, Ohm's law, electrical energy, electrical Power, power dissipation in resistance

Unit -2: D.C. circuit: **(8 Lectures)**

Introduction, current direction and voltage polarity of circuit components, voltage notation, resistances in series, Voltage division rule, resistances in Parallel, Total power in series and parallel circuits, series parallel circuits

Unit -3: Kirchhoff's Laws and Theorems: **(7 Lectures)**

Kirchhoff's laws- Kirchhoff's voltage and current law, Thevenin's theorem, Superposition theorem, Norton's theorem

Unit-4: AC fundamentals: **(8 Lectures)**

Introduction, types of alternating current or voltage, terms related to AC- cycle, time period , frequency, Amplitude (Peak value), Peak to peak values, Instantaneous value, RMS value, Average value, concept of phase difference, Harmonics

Reference Books:

- A text book of Applied Electronics R. S. Sedha, S. Chand Publication , 1st edition (2008).
- Principles of Electronics - V. K. Mehta, Rohit Mehta, S. Chand Publications, 11th edition (2008)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata McGraw Hill , 1st edition (2008)
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st edition (2011).
- Integrated Electronics, J. Millman & C. C. Halkias, 2nd edition, 2010, TMH.

B. Sc. Part – I Semester -I ELECTRONICS
OEC -II: OEC03ELE12: SEMICONDUCTOR DEVICES-I
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand the principles of semiconductors,

CO2: Understand the construction, characteristic and working of PN junction diodes,

CO3: Understand the construction, working principles and IV characteristics of special purpose diodes

CO4: Understand the construction, working principles and working of bipolar junction transistor (BJT)

Unit-1: Semiconductors: **(7 Lectures)**

Bohr's atomic Model, energy levels, energy bands, Metals insulators and semiconductors, Intrinsic semiconductors, Extrinsic Semiconductors (P- type and N-type), Majority and minority charge carriers

Unit-2: Semiconductor Diode: **(8 Lectures)**

Construction of PN junction diode, Formation of depletion layer, barrier voltage, V-I characteristics of PN Junction diode- Forward and reverse characteristics, Diode power and current ratings of diodes, Application- rectifiers,

Unit- 3: Special purpose Diodes **(7 Lectures)**

Introduction, Zener diode – construction and working, IV characteristics, Construction and working of LED applications- 7 segment display, Dot-Matrix display, Photo diode construction and working , photodiode applications, photoconductive cells, photovoltaic cell (solar cell) Laser diode.

Unit-4: Bipolar Junction Transistor (BJT) **(8 Lectures)**

Introduction, construction and working of BJT, configurations of transistors (CB, CE, CC), input and output characteristics of CE configuration , relation between current gains, concept of DC load line and Q point , applications of transistors- transistor as an amplifier and switch in CE configuration.

Reference Books:

- Principles of Electronics - V. K. Mehta, Rohit Mehta, S. Chand Publications, 11th edition (2008)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata McGraw Hill , 1st edition (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication , 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st edition (2011).
- Integrated Electronics, J. Millman & C. C. Halkias, 2nd edition, 2010, TMH.

B. Sc. Part – I Semester -I ELECTRONICS

OEC-PR-I: OEC03ELE19: OEC ELECTRONICS LAB-1

Practical: Four lectures of 60 minutes per week per batch

Marks: 25 (Credits 02)

CIRCUIT FUNDAMENTALS LAB (At least 6 experiments)

1. Verification of Ohm's Law
2. Study of equivalent resistance of series and parallel resistive circuit.
3. Study of Voltage division rule
4. Study of current division rule.
5. Study Kirchhoff's Laws
6. Verification of Thevenin`s Theorem
7. Verification of Norton`s Theorem
8. Verification of Superposition Theorem

SEMICONDUCTOR DEVICES AND CIRCUITS LAB (At least 6 experiments)

1. Study of the I-V Characteristics of p-n junction diodes
2. Study of Half Wave rectifier
3. Study of Full Wave rectifier with and without filter.
4. Study of the I-V characteristics of zener diode.
5. Study of photo-voltaic cell.
6. Study of the I-V characteristics of photo diode
7. Study of Input ,Output and transfer Characteristics of CE configuration of BJT

B. Sc. Part – I Semester -II ELECTRONICS
OEC-III: OEC03ELE21: CIRCUIT FUNDAMENTALS-II
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand the specifications, classification, construction, and applications of passive circuit elements

CO2: Understand the concepts, construction, and types of passive circuit elements

CO3: Understand the principles, types, and operation of circuit control and protective devices, including switches, fuses, circuit breakers, and relays.

CO4: Understand the principles, types, and characteristics of voltage and current sources

Unit-1: Passive circuit elements-I: **(7 Lectures)**

Introduction, resistors- specifications, classification of resistors, construction of carbon composition resistors, wire wound resistors, film resistors, variable resistors: potentiometers, rheostat, thermistors, colour code system for resistor, Capacitor: concept of capacitance, types of capacitors.

Unit-2: Passive circuit elements-II: **(7 Lectures)**

Introduction, inductors, Concept of self-inductance, construction and types of inductors. concept of mutual inductance , construction and working of transformer, types of transformers, Wires: different types of wires.

Unit-3 Circuit controllers: **(8 Lectures)**

Introduction, switch, switch action, types of switches, commercially available switches, fuses, fuse ratings, circuit breaker, relays: electromagnetic relay construction and working.

Unit-4: Voltage and Current sources: **(8 Lectures)**

Introduction, batteries, regulated DC supplies, solar cell, generators, oscillators and signal generators, internal resistance of source, concept of voltage source, ideal and practical voltage sources. concept of current source, ideal and practical current sources.

Reference Books:

- A Textbook of Applied Electronics - Dr. R. S. Sedha, S. Chand Publications, edition (2013)
- Principles of Electronics - V. K. Mehta, Rohit Mehta S. Chand Publications, 11th edition (2008)
- Basic Electronic- B. Grob, McGraw Hill, 9th Edition (2003)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S.C. Gupta, Tata McGraw Hill, 1st edition (2008)

B. Sc. Part – I Semester -II ELECTRONICS

OEC -IV: OEC03ELE22: SEMICONDUCTOR DEVICES-II

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand the concept of transistor biasing and different methods of transistor biasing

CO2: Study the construction, working principles, and I-V characteristics (output and transfer) of JFETs and MOSFETs.

CO3: Explore the concept of Single stage and multistage amplifiers

CO4: Understand feedback amplifiers and oscillators

Unit-1: Transistor Biasing **(7 Lectures)**

Transistor Biasing, Need of Transistor Biasing, Stability Factor, Methods of Transistor Biasing Fixed Bias Method, Voltage Divider Bias Method.

Unit-2: Unipolar Devices: **(8 Lectures)**

JFET: Construction, working and I-V characteristics (output and transfer), MOSFET: Construction, working and I-V characteristics (output and transfer).UJT: introduction, structure and characteristics.

Unit-3: Amplifiers **(7 Lectures)**

Single stage CE amplifier: Current gain, Voltage gain, Power gain, input and output resistances, frequency Response.

Cascaded Amplifiers: Two stage RC, LC, TC and DC Coupled Amplifiers and their Frequency Responses, Concept of Differential amplifier and its advantages.

Unit-4: Feedback Amplifier and Oscillators: **(8 Lectures)**

Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Oscillators: Barkhausen criterion for sustained oscillations. Phase shift, Wein Bridge, Hartley and Colpitt's oscillator .UJT as relaxation oscillator.

Reference Books:

- Principles of Electronics - V. K. Mehta, Rohit Mehta, S. Chand Publications, 11th edition (2008)
- Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata McGraw Hill , 1st edition (2008)
- A text book of Applied Electronics R. S. Sedha, S. Chand Publication , 1st edition (2008).
- Electronic Devices and Circuits, Allen Mottershead, Goodyear Publishing Company, 1st edition (2011).
- Integrated Electronics, J. Millman & C. C. Halkias, 2nd edition, 2010, TMH.

B. Sc. Part – I Semester -II ELECTRONICS

OEC-PR-I: OEC03ELE29: OEC ELECTRONICS LAB-2

Practical: Four lectures of 60 minutes per week per batch

Marks: 25 (Credits 02)

CIRCUIT FUNDAMENTALS LAB (At least 6 experiments)

1. Measurement of amplitude, frequency and phase difference of different waveform using CRO.
2. Study of basic electronic components
3. Identification and verification of resistance
4. Study of charging and discharging of capacitor.
5. Study of Transformer
6. Study of switch and Relay.
7. Measurement of amplitude, frequency and phase difference of different waveform using CRO.

SEMICONDUCTOR DEVICES AND CIRCUITS LAB (At least 6 experiments)

1. Study of voltage divider biasing method for transistor.
2. Study of FET characteristics
3. Study of Common Emitter Amplifier
4. Study of RC Phase shift Oscillator/
5. Study of Wein bridge Oscillator.
6. Study of Hartley Oscillator/Colpitt`s Oscillator.
7. Transistor as Switch

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B. Sc. Part – I Semester -II ELECTRONICS
SEC-I: VSC03ELE21: Circuit simulation Lab
Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

Analog Electronics Lab

1. Determining the equivalent resistance of series resistors and parallel resistors
2. Study of Voltage Divider rule and Current Division rule
3. Verification /Validation of Kirchhoff's Current law and Kirchhoff's Voltage law
4. Verification/ Validation of Thevenin's theorem
5. Verification/ Validation of Superposition theorem
6. Verification/ Validation of Norton's theorem
7. Verification /Validation of Maximum Power Transfer Theorem
8. Measurement of Amplitude, frequency and Phase difference using Oscilloscope
9. Investigation of P-N Junction diode characteristics
10. Study of Zener Voltage Regulator
11. Study of Half Wave Rectifier Circuit
12. Study of Full Wave rectifier Circuit with C filter/π filter
13. Study of Transistor as Switch
14. Study of Common Emitter Characteristics
15. Design and assemble Single stage CE amplifier
16. Study of JFET Characteristics
17. Study of Hartley Oscillator/Colpitt's Oscillator
18. Study of the RC Phase Shift Oscillator
19. Study of the Wein Bridge Oscillator

Digital Electronics Lab

1. Study of Logic gates
2. Study of Universal Building Block using NAND gate
3. Study of Demorgan's theorem
4. Study of Half and Full Adder
5. Study of Half and Full Subtractor
6. Building and testing of 4:1 Multiplexer using Logic gates/IC74153
7. Building and testing of 1:4 De-multiplexer using Logic gates/IC74139
8. Building and testing of decimal to BCD Encoder using logic gates.
9. Building and testing of BCD to 7 segment decoder using IC 7447
10. Building and testing of RS Flip-Flop using NAND/NOR gate
11. Building and testing D and JK Flip-Flop using IC
12. Construction and study of Shift Register (serial-in and serial-out) using D- type/JK Flip-Flop ICs
13. Study of Astable Multivibrator using IC 555 Timer.
14. Study of Monostable Multivibrator using IC 555 Timer
15. Study of Bistable Multivibrator using IC 555 Timer
16. Building and testing of JK Flip-Flops using Gates
17. Building and testing of 4-bit asynchronous counter using Flip-Flop ICs

B. Sc. Part – I Semester -I ELECTRONICS

IKS: IKS03GEC11: Indian Knowledge System

Theory: 30 hrs.

Marks-25 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Understand the concepts, technicalities and computational procedures developed by great Indian Astronomers over the past 2000 years

CO2: Understand the nature of Contribution Made by Indian mathematicians

CO3: This course aims to provide students with a comprehensive understanding of the historical progression of chemistry in India. Covering key periods from the pre-Harappan era to the Iatrochemical period

CO4: Understand the importance of Ayurveda in everyday life and enable to advise the constitutional method of diet and Ayurveda life style.

Unit-1: Indian Astronomy: **(8 lectures)**

Ancient Indian Astronomy, Aryabhata, Astronomers after Aryabhata, Celestial Horizon, Meridian, Pole star and directions, Zodiac and constellations, Zodiac and Rashis, Naksatra system, Civil day and Sideral day, Solar year and Civil calendar, Solar month and lunar month, Yuga system, Indian Eras, Cause of Lunar eclipse, angular diameter of the shadow-cone, Cause of solar eclipse, Angular distance between the sun and the moon at the beginning and end of a solar eclipse.

References:

- Indian Astronomy: An Introduction by S. Balachandra Rao
- Eclipses in Indian Astronomy by S. Balachandra Rao & Padmaja Venugopal
- Ancient Indian Astronomy: Planetary Positions and Eclipses by S. Balachandra Rao
- Indian Astronomy: Concepts and Procedures by S. Balachandra Rao

Unit-2: Maths in Ancient and Medieval India **(7 lectures)**

Unique Aspects of Indian Mathematics, Number System in India- Historical Evidence, Salient Features of the Indian Numeral System, Concept of Zero and it's Importance, PINGALA and the binary system with Combinatorial Problems in Chandah-Sastra of PINGALA, Great Mathematicians and their Contributions, Property of Right Angle Triangle in Shlba-sutras, The value of π, Magic Square in India

Reference Book:

- Introduction to Indian Knowledge System Concepts and Applications, By B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R.N.- PHI Learning private limited Delhi-2023

Unit-3: Chemistry in Ancient and Medieval India **(7 lectures)**

Introduction, Chemistry in pre-Harrapan period, Chemistry in Indus Valley civilization, Chemistry in post-Harrapan period, Chemistry in Vedic and Ayurvedic: Chemistry in Charaka and Sushruta, Chemistry in Tantric Period: Rasaratnakara of Nagarjuna, Iatrochemical period.

References: History of Chemistry in Ancient and Medieval India by P. C. Ray

Unit-4: Introduction to Ayurveda. **(8 lectures)**

Ayurvedic medicinal system, Principles of Ayurveda (Vata, Pitta, Kapha), Ayurvedic therapies, Unani system of medicine, Siddha system of medicine, Future of herbal drugs, Study of medicinal plants- Punarnava, Vasaka, Shatavar, Brahmi and Arjuna

References:

- Textbook of Pharmacognosy (Second edition) , Dr. Mohammed Ali, CBS Publishers and distributers, New Delhi.
- A Text book on Research methodology and Medical Statistics in Ayurveda, Rashmi Pujar & Aswin Haridas, A house of oriental, Ayurvedic books, Varanasi.
- Ayurveda- The Science of Self-Healing, Dr. Vasant Lad, A Practical Guide, Motilal Banarsidas Publishers, Pvt. Ltd, India.

Question Paper Format:

Seat No.	

Ques. paper code	

VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

B.Sc. Part- I (Electronics) (Semester-I) Examination.....
Course Code and Name: DSC03ELE11: Analog Electronics-I

Day: Time: 2 hours
Date: --/--/---- Marks : 40

Instructions:

1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table/calculator is allowed.

Q. 1. Select correct alternative (One mark each): **[8]**

i) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

ii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

iii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

iv) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

v) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

vi) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

vii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

viii) Xyzabcdefghijklmnop ----------
a) -------- b) -------- c) -------- d) --------

Q.2. Attempt any TWO (Eight marks each): **[16]**

i) Xyzabcdefghijklmnop.
ii) Xyzabcdefghijklmnop.
iii) Xyzabcdefghijklmnop.

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Q.3. Attempt any FOUR (Four marks each): **[16]**

i) Xyzabcdefghijklmnop.

ii) Xyzabcdefghijklmnop.

iii) Xyzabcdefghijklmnop.

iv) Xyzabcdefghijklmnop.

v) Xyzabcdefghijklmnop.

vi) Xyzabcdefghijklmnop.

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Equivalence of Courses:

B.Sc. Part I (Semester I and II)

Semester	Old Course			Course in NEP		
	Course code	Course Name	Credits	Course code	Course Name	Credits
I	DSC-1005A1	Analog Electronics-I	2	DSC03ELE11	Analog Electronics-I	2
	DSC-1005A2	Digital Electronics-I	2	DSC03ELE12	Digital Electronics-I	2
II	DSC-1005B1	Analog Electronics-II	2	DSC03ELE21	Analog Electronics-II	2
	DSC-1005B2	Digital Electronics-II	2	DSC03ELE22	Digital Electronics-II	2
	DSC-1005A & DSC-1005B	Electronics Lab(I)-	4	DSC03ELE19	DSC Electronics Lab-1	2
				DSC03ELE29	DSC Electronics Lab-2	2

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