

SEMESTER-WISE TITLES OF THE PAPERS

YEAR	SEME- STER	COURSE CODE	PAPER TITLE	THEORY / PRACTICAL	CREDIT
FOR UG CERTIFICATE COURSES					
FIRST YEAR	I		Basic Electrical & Electronic Principles	Theory + Practical	1) + 2) } = 3
	II		Applications of Semiconductor Devices	Theory + Practical	1) + 2) } = 3
FOR UG DIPLOMA COURSES					
SECOND YEAR	III		Applications of Digital Electronics & Op-Amps	Theory + Practical	1) + 2) } = 3
	IV		Basics of Communication Systems	Theory + Practical	1) + 2) } = 3

COURSE PREREQUISITES

To study this course, a student must have had the subject **Physics** in class 12th.

COURSE INTRODUCTION

In view of National Education Policy-2020 (NEP-2020), Department of Higher Education, U.P. Government, Lucknow, has developed Syllabus Guidelines for Common Minimum Syllabus for all U.P. State Universities and Colleges. Based on these guidelines a 3 credit Vocational Course per semester (out of total 21 to 27 credits per semester) for first two years (first four semesters) of Higher Education (UG) is proposed. This Vocational Course is not a part of Skill based Vocational Courses under National Skill Qualification Framework (NSQF), the guidelines of which were developed by University Grants Commission (UGC).

The NSQF is a merger of the scheme of Community Colleges, the scheme of B. Voc. Degree Programmes and the scheme of Deen Dayal Upadhyay Centers for Knowledge Acquisition and Up-gradation of Skilled Human Abilities and Livelihood (KAUSHAL). The NSQF is a competency based framework that organizes qualifications according to a series of knowledge, skills and aptitude. The NSQF levels, graded from one to ten, are defined in terms of learning outcomes which the learner must possess and have a 60 % weightage for Skill Development Components and a 40 % weightage for General Education Component.

Our teaching so far has been aimed more at formal knowledge and understanding instead of training and application oriented. Presently, the emphasis is more on training, application and to some extent on appreciation, the fostering in the pupils of independent thinking and creativity. Surely, teaching has to be more objective based. The process of application based training, whether we call it a thrill or ability, is to be emphasized as much as the

content.

Today electronics have invaded every walk of life and its applications are increasing at a very fast rate. Broadly, the various applications of electronics range from Entertainment Electronics, Industrial Electronics, Defense Electronics, Medical Electronics, Communications, Instrumentation, Navigation & Aircraft Landing, Telemetry, etc.

Based on these aspects, a Vocational Course in '**Electronics Technician**' is proposed. It is a progressive Vocational Course, one each in first four semesters (first two years) of Higher Education (UG).

COURSE OBJECTIVE

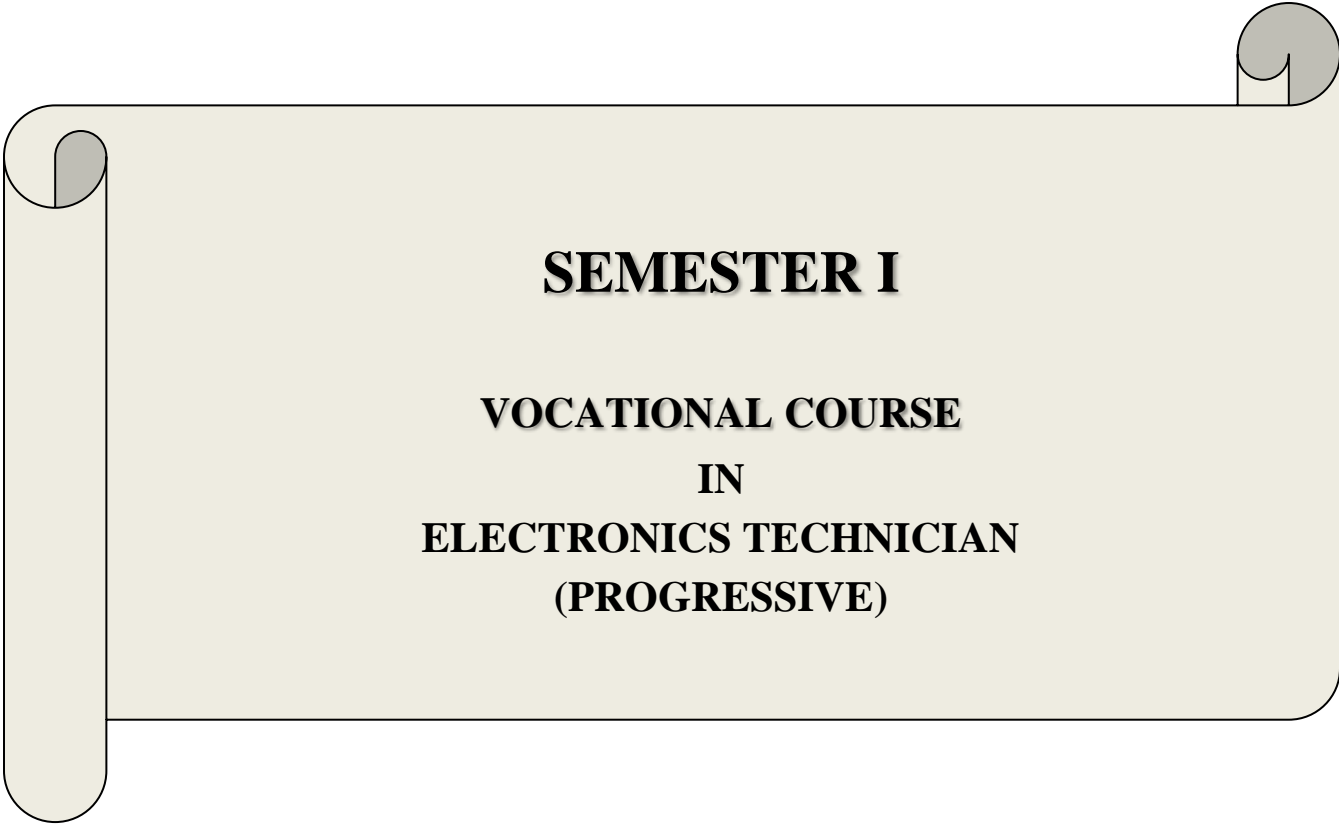
The objective of proposed Vocational Course in '**Electronics Technician**' is not to track every epsilon and delta related with the topic but to give the essence of the overall package. This comprises the basics of theoretical and practical / training aspects in the fields of Electronics and Communication along with assembling, testing and maintenance of Analog and Digital Electronic Equipments.

The general framework of this course provides the flexibility to easily blend with numerous job requirements in related sectors. The finer details, specific to requirement can be brushed with other bridge courses available both offline and online so as to have an advanced knowledge in the field.

COURSE FEATURES

Title of Course	Electronics Technician
Nodal Department of HEI to Run Course	
Broad Area / Sector	Electronics
Sub Sector	Electronics
Nature of Course (Independent / Progressive)	Progressive (Semester I to Semester IV)
Name of Suggestive Sector Skill Council	Electronics Sector Skill Council of India (ESSCI)
Aliened NSQF level	Not Applicable
Expected Fees of the Course (Free / Paid)	
Stipend to Student Expected From Industry	
Number of Seats	
Course Code	
Credits	03 (Theory 1 + Practical 2)
Max. Marks: 100	Min. Marks:
Name of Proposed Skill Partner (Please specify Name of Industry / Company etc. for Practical /	

<p>Training / Internship / On-the-Job-Training (OJT)</p>	
<p>Job Prospects—Expected fields of occupation where students will be able to get job after completing this course (Please specify Name / Type of Industry / Company etc.)</p>	<p>Assembling, Testing, Maintenance, Sales & Service, Dealership and Manufacturing of electronic equipments.</p> <p>Wage Employment</p> <ul style="list-style-type: none"> • Electronic Equipment Assemblies • Electronic Equipment Tester • Electronic Equipment Repairer • Installation & Maintenance of Electronic Equipment • Electronic Equipment Sales and Service <p>Self Employment</p> <ul style="list-style-type: none"> • Servicing of Electronic Equipment • Dealership /Agency for Electronic Equipment • Manufacturing of Electronic Equipment



SEMESTER I

VOCATIONAL COURSE

IN

ELECTRONICS TECHNICIAN

(PROGRESSIVE)

Year: First		Semester: I	
Course Title: Electronics Technician			
Paper Title: Basic Electrical & Electronic Principles			Course Code:
Course Outcomes (COs)			
<ul style="list-style-type: none"> • Understand the concepts of Ohm's Law and Kirchhoff's Law. • Learn basic skills to handle simple DC & AC Circuits. • Comprehend the difference between Conductors, Semiconductors & Insulators. • Study the formation of Depletion Layer and Current Flow Mechanism in a Diode. • Comprehend the utilitarian aspects of PN Junction & Zener Diodes. • Study the principles and applications of Power Supply. 			
Credits: 3		Theory 1 + Practical 2	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 1-0-4			
Unit	Topics		No. of Lectures
THEORY			
I	<u>Current Electricity</u> Ohm's Law, Kirchhoff's Law, Concept of EMF, Resistors, Capacitors, Inductors, Electrical Energy & Power, Simple DC & AC Circuits involving R, L & C.		5
II	<u>Semiconductors</u> Semiconductor Physics, P & N Type Semiconductors, Theory of Depletion Layer, Current Flow Mechanism in Forward & Reverse Biased Diode, Diode Fabrication.		5
III	<u>Diode Applications</u> Principle, Structure, Characteristics & Applications of PN Junction & Zener Diodes, Half & Full Wave Rectifiers, Filter Circuits, Power Supplies.		5

PRACTICAL / TRAINING / INTERNSHIP
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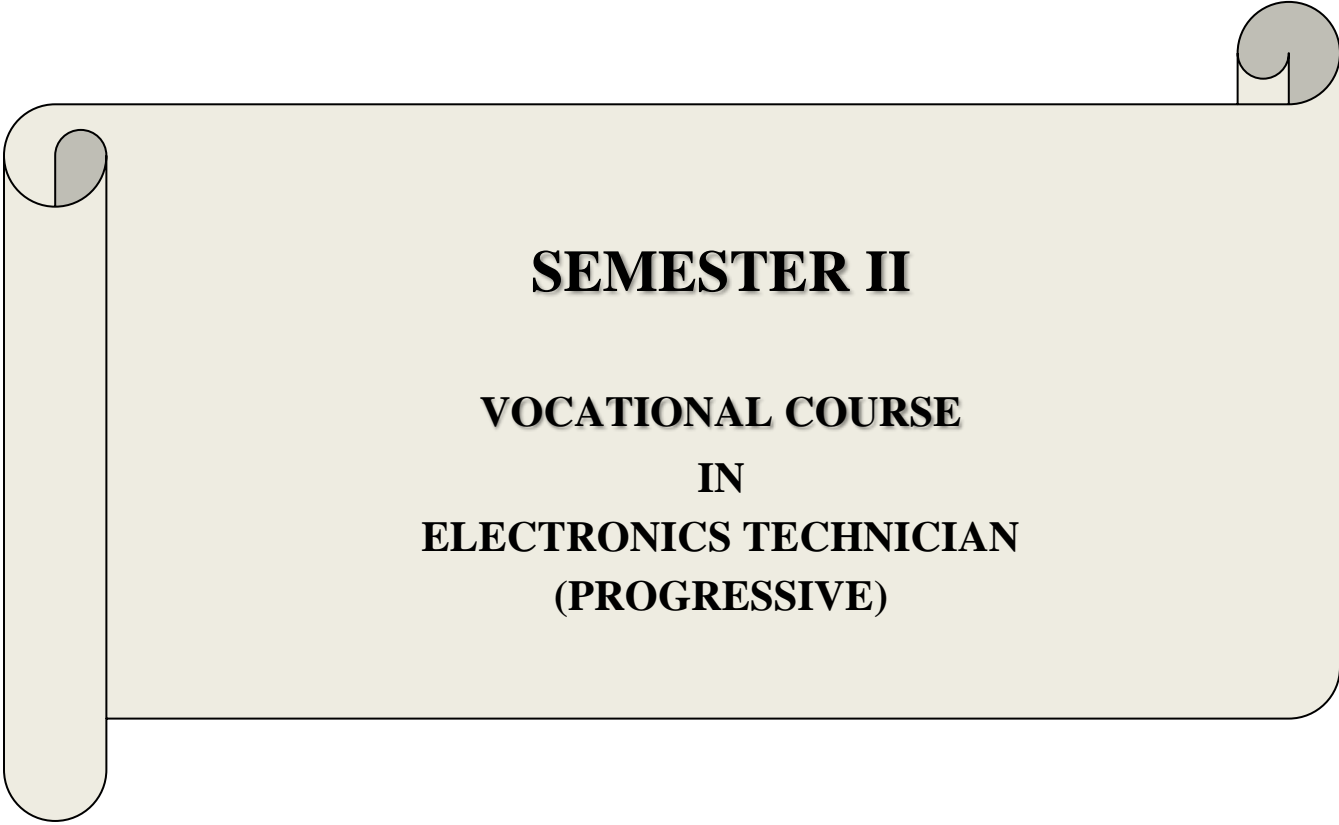
IV	<ul style="list-style-type: none"> • Applications of Basic Electrical and Electronic Instruments • Classification and use of Resistors • Classification and use of Capacitors • Classification and use of Inductors • Classification and use of Transformers • Concepts and practice of Soldering • Study of RL, RC, LC and RLC Circuits • Characteristics of PN Junction and Zener Diodes • Classification and use of Filter Circuits • Study of Half Wave and Full Wave Rectifiers • Study of Un-Regulated and Regulated Power Supplies <p>ONLINE VIRTUAL LAB</p> <ul style="list-style-type: none"> • Amrita Vishwa Vidyapeetham, https://vlab.amrita.edu/index.php • Virtual Labs an initiative of MHRD Govt. of India, http://vlabs.iitkgp.ac.in/vlt/# • labAlive, https://www.etti.unibw.de/labalive/ 	60
Suggested Readings		
<ol style="list-style-type: none"> 1. A. Sudhakar, S.S. Palli, “Circuits and Networks: Analysis and Synthesis”, McGraw Hill, 2015, 5e 2. R.L. Boylestad, L. Nashelsky, “Electronic Devices & Circuit Theory”, Prentice-Hall of India Pvt. Ltd., 2015, 11e 3. J. Millman, C.C. Halkias, Satyabrata Jit, “Electronic Devices and Circuits”, McGraw Hill, 2015, 4e 4. B.G. Streetman, S.K. Banerjee, “Solid State Electronic Devices”, Pearson Education India, 2015, 7e 5. J.D. Ryder, “Electronic Fundamentals and Applications”, Prentice-Hall of India Private Limited, 1975, 5e 6. V.K. Mehta, Rohit Mehta, “Principles of Electronics”, S. Chand Publishing, 2020, 12e 7. S.L. Gupta, V. Kumar, “Hand Book of Electronics”, Pragati Prakashan, Meerut, 2016, 43e 		
Suggestive Digital Platforms / Web Links		
<ol style="list-style-type: none"> 1. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd 2. Uttar Pradesh Higher Education Digital Library, http://heecontent.upsdc.gov.in/Home.aspx 3. Swayam Prabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/home 4. MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu/ 		
Suggested Continuous Internal Evaluation (CIE) Methods		
20 marks for Test / Quiz / Assignment / Seminar / Viva Voce 05 marks for Class Interaction		
Course Prerequisites		
Passed class 12 th with Physics		

Suggested Equivalent Online Courses

1. National Programme on Technology Enhanced Learning (NPTEL), <https://nptel.ac.in/>
2. Swayam - Government of India, <https://swayam.gov.in/>
3. MIT Open Course Ware - Massachusetts Institute of Technology, <https://ocw.mit.edu/>
4. Coursera, <https://www.coursera.org/in>
5. edX, <https://www.edx.org/>

Further Suggestions

- The institution may add / modify the experiments of the same standard in the paper.
- Books published in Hindi & Other Reference / Text Books may be added to this list by individual institutions.
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SEMESTER II

VOCATIONAL COURSE

IN

ELECTRONICS TECHNICIAN

(PROGRESSIVE)

Year: First		Semester: II	
Course Title: Electronics Technician			
Paper Title: Applications of Semiconductor Devices			Course Code:
Course Outcomes (COs)			
<ul style="list-style-type: none"> • Understand the Transistor Action and Biasing Techniques. • Study the principles and applications of CB, CE & CC Configurations. • Comprehend the difference between RC Coupled & Transformer Coupled Amplifiers. • Study the principles and applications of various Feedback & Oscillator Circuits. • Study the Characteristics and Applications of JFET & MOSFET. • Comprehend the utilitarian aspects of SCR & UJT. 			
Credits: 3		Theory 1 + Practical 2	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 1-0-4			
Unit	Topics		No. of Lectures
THEORY			
I	<u>Transistors</u> Bipolar Junction PNP & NPN Transistors, Study of CB, CE & CC Configurations, Biasing Techniques.		5
II	<u>Amplifiers & Oscillators</u> Classification of Amplifiers, Principles & Applications of RC Coupled & Transformer Coupled Amplifiers, Study of Feedback & Oscillator Circuits.		5
III	<u>Other Semiconductor Devices</u> Principle, Structure, Characteristics & Applications of JFET, MOSFET, SCR & UJT.		5

PRACTICAL / TRAINING / INTERNSHIP


IV	<ul style="list-style-type: none">• Applications of Basic Electrical and Electronic Instruments• Characteristics of a Transistor (PNP and NPN) in CE, CB and CC Configurations• Study of Biasing Techniques• Comparative Study of CE, CB and CC Amplifier• Study of Clippers and Clampers• Frequency Response of RC Coupled and Transformer Coupled Amplifiers• Study of Feedback Circuits• Study of Schmitt Trigger• Study of Wein Bridge and Hartley Oscillators• Characteristics of FET and MOSFET• Characteristics and Applications of SCR and UJT <p>ONLINE VIRTUAL LAB</p> <ul style="list-style-type: none">• Amrita Vishwa Vidyapeetham, https://vlab.amrita.edu/index.php• Virtual Labs an initiative of MHRD Govt. of India, http://vlabs.iitkgp.ac.in/vlt/#• labAlive, https://www.etti.unibw.de/labalive/	60
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<ol style="list-style-type: none">1. R.L. Boylestad, L. Nashelsky, “Electronic Devices & Circuit Theory”, Prentice-Hall of India Pvt. Ltd., 2015, 11e2. J. Millman, C.C. Halkias, Satyabrata Jit, “Electronic Devices and Circuits”, McGraw Hill, 2015, 4e3. B.G. Streetman, S.K. Banerjee, “Solid State Electronic Devices”, Pearson Education India, 2015, 7e4. J.D. Ryder, “Electronic Fundamentals and Applications”, Prentice-Hall of India Private Limited, 1975, 5e5. V.K. Mehta, Rohit Mehta, “Principles of Electronics”, S. Chand Publishing, 2020, 12e6. S.L. Gupta, V. Kumar, “Hand Book of Electronics”, Pragati Prakashan, Meerut, 2016, 43e		
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Suggested Continuous Internal Evaluation (CIE) Methods		
20 marks for Test / Quiz / Assignment / Seminar / Viva Voce 05 marks for Class Interaction		
Course Prerequisites		
Passed previous courses of this series in Semester I		

Suggested Equivalent Online Courses

1. National Programme on Technology Enhanced Learning (NPTEL), <https://nptel.ac.in/>
2. Swayam - Government of India, <https://swayam.gov.in/>
3. MIT Open Course Ware - Massachusetts Institute of Technology, <https://ocw.mit.edu/>
4. Coursera, <https://www.coursera.org/in>
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SEMESTER III

VOCATIONAL COURSE

IN

ELECTRONICS TECHNICIAN

(PROGRESSIVE)

Year: Second		Semester: III	
Course Title: Electronics Technician			
Paper Title: Applications of Digital Electronics & Op-Amps			Course Code:
Course Outcomes (COs)			
<ul style="list-style-type: none"> • Study the principles and applications of Logic Gates. • Learn basic skills to design Logic Circuits. • Comprehend the design of Arithmetic Circuits. • Comprehend the functionality of Data Processing Circuits. • Learn the utilitarian aspects of Op-Amps. • Study the principles and applications of ICs. 			
Credits: 3		Theory 1 + Practical 2	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 1-0-4			
Unit	Topics		No. of Lectures
THEORY			
I	<u>Logic Gates</u> Properties & Applications of OR, AND, NOT, NOR, NAND, EX-OR & EX-NOR Gates, Implementation of OR, AND & NOT Gates using Diodes & Transistor.		5
II	<u>Combinational & Sequential Circuits</u> Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexer, Demultiplexer and Flip-Flops.		5
III	<u>Op-Amps & ICs</u> Basic Parameters & Applicability in Analog Computation of Op-Amps, Linear ICs and Operations of 555 Timer.		5

PRACTICAL / TRAINING / INTERNSHIP		
IV	<ul style="list-style-type: none"> • Study and Verification of Basic Logic Gates • Study and Verification of Universal Logic Gates • Study and Verification of Exclusive Logic Gates • Construction and Operation of Combinational Circuits • Construction and Operation of Sequential Circuits • Construction and Operation of Data Processing Circuits • Op-Amp as Inverting and Non-Inverting Amplifiers • Op-Amp as Integrator and Differentiator • Frequency Response of Op-Amp • IC 555 as Astable and Monostable Multivibrators • IC 555 as Schmitt Trigger <p>ONLINE VIRTUAL LAB</p> <ul style="list-style-type: none"> • Amrita Vishwa Vidyapeetham, https://vlab.amrita.edu/index.php • Virtual Labs an initiative of MHRD Govt. of India, http://vlabs.iitkgp.ac.in/vlt/# • labAlive, https://www.etti.unibw.de/labalive/ 	60
Suggested Readings		
<ol style="list-style-type: none"> 1. D. Leach, A. Malvino, Goutam Saha, “Digital Principles and Applications”, McGraw Hill, 2010, 7e 2. William H. Gothmann, “Digital Electronics: An Introduction to Theory and Practice”, Prentice-Hall of India Private Limited, 1982, 2e 3. R.P. Jain, “Modern Digital Electronics”, McGraw Hill, 2009, 4e 4. Ramakant A. Gayakward, “Op-Amps and Linear Integrated Circuits”, Pearson Education India, 2015, 4e 5. V.K. Mehta, Rohit Mehta, “Principles of Electronics”, S. Chand Publishing, 2020, 12e 6. S.L. Gupta, V. Kumar, “Hand Book of Electronics”, Pragati Prakashan, Meerut, 2016, 43e 		
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Suggested Continuous Internal Evaluation (CIE) Methods		
<p>20 marks for Test / Quiz / Assignment / Seminar / Viva Voce</p> <p>05 marks for Class Interaction</p>		
Course Prerequisites		

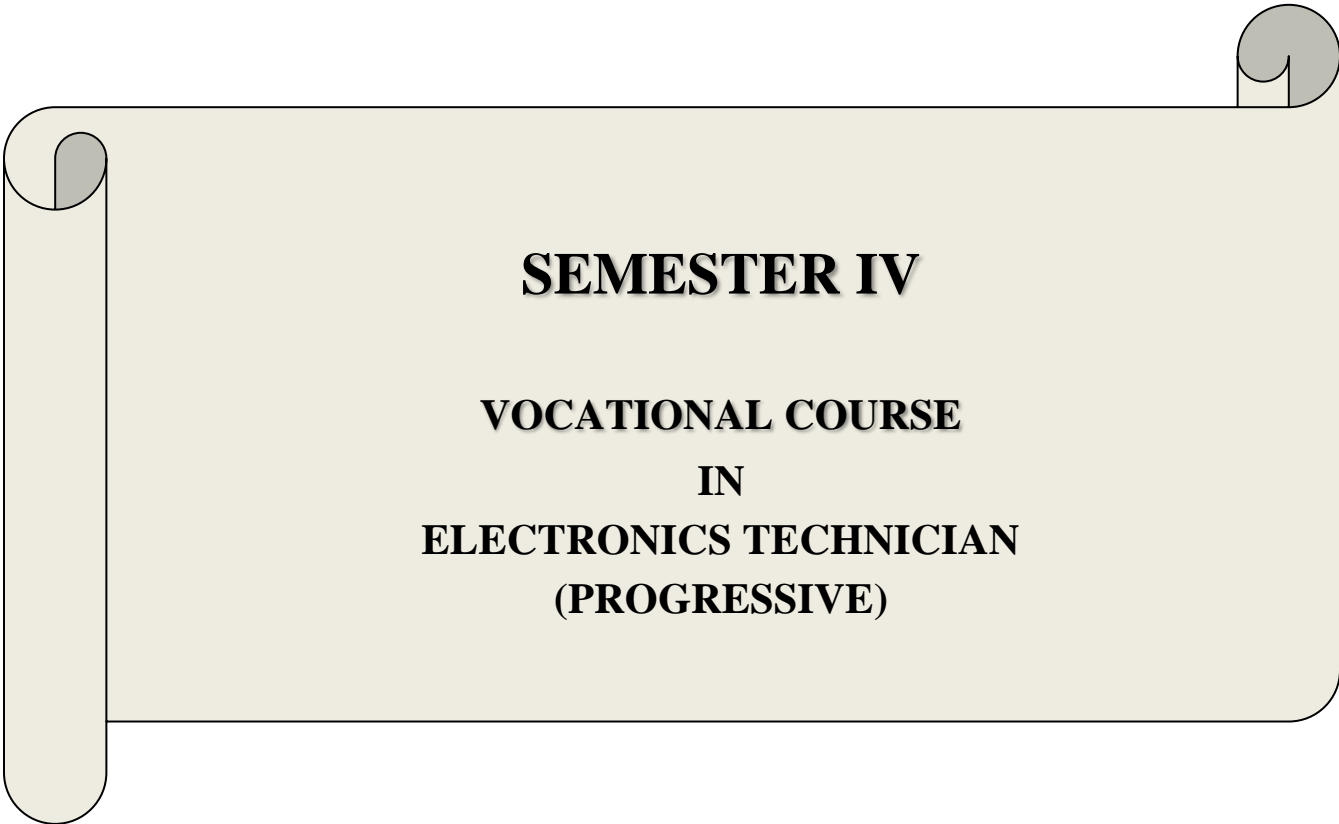
Passed previous courses of this series in Semester II

Suggested Equivalent Online Courses

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SEMESTER IV

VOCATIONAL COURSE

IN

ELECTRONICS TECHNICIAN

(PROGRESSIVE)

Year: Second		Semester: IV	
Course Title: Electronics Technician			
Paper Title: Basics of Communication Systems			Course Code:
Course Outcomes (COs)			
<ul style="list-style-type: none"> • Comprehend the basic components of Communication System. • Learn the features of different Communication Systems. • Study the principles and applications of various Modulation Techniques. • Implement the concept of Demodulation. • Learn the utilitarian aspects of Fiber Optics. • Comprehend the basics of Optical Fiber Communication System. 			
Credits: 3		Theory 1 + Practical 2	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 1-0-4			
Unit	Topics		No. of Lectures
THEORY			
I	<u>Communication System</u> Introduction & Block Diagram, Components of Communication System - Amplifier, Transmitter, Channel Receiver & Band Spectrum Modulation, Types of Communication Systems.		5
II	<u>Modulation & Demodulation</u> Types of Modulation, Principles & Applications of Amplitude Modulation, Frequency Modulation & Phase Modulation, Concept of Demodulation.		5
III	<u>Optical Fibers</u> Basics of Fiber Optics, Step & Graded Index Fiber, Acceptance Angle & Numerical Aperture, Fiber Losses and Applications of Optical Fibers.		5

PRACTICAL / TRAINING / INTERNSHIP	
IV	<ul style="list-style-type: none"> • Study of Amplitude Modulation and Demodulation • Study of Frequency Modulation and Demodulation • Study of Phase Modulation and Demodulation • Study of SSB-SC Modulation and Demodulation • Study of DSB-SC Modulation and Demodulation • Characteristics of LED • Measurement of Numerical Aperture • Measurement of Bending Losses in Optical Fiber • Set up a Fiber Optic Analog and Digital Link • Operation of Fiber Optic Bi-directional Communication • Study the Wavelength Division Multiplexing <p>ONLINE VIRTUAL LAB</p> <ul style="list-style-type: none"> • Amrita Vishwa Vidyapeetham, https://vlab.amrita.edu/index.php • Virtual Labs an initiative of MHRD Govt. of India, http://vlabs.iitkgp.ac.in/vlt/# • labAlive, https://www.etti.unibw.de/labalive/
Suggested Readings	
<ol style="list-style-type: none"> 1. M.S. Roden, “Analog and Digital Communication Systems”, Discovery Press, 2003, 5e 2. D. Roddy, J. Coolen, “Electronic Communications”, Pearson Education Limited, 2008, 4e 3. Jeffrey S. Beasley, G.M. Miller, “Modern Electronic Communication”, Pearson Education Limited, 2007, 9e 4. John M. Senior, “Optical Fiber Communications: Principles & Practice”, Pearson Education Limited, 2010, 3e 5. John Wilson, John Hawkes, “Optoelectronics: Principles & Practice”, Pearson Education Limited, 2018, 3e 6. V.K. Mehta, Rohit Mehta, “Principles of Electronics”, S. Chand Publishing, 2020, 12e 7. S.L. Gupta, V. Kumar, “Hand Book of Electronics”, Pragati Prakashan, Meerut, 2016, 43e 	
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Suggested Continuous Internal Evaluation (CIE) Methods	
20 marks for Test / Quiz / Assignment / Seminar / Viva Voce 05 marks for Class Interaction	
Course Prerequisites	

Passed previous courses of this series in Semester III

Suggested Equivalent Online Courses

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2. Swayam - Government of India, <https://swayam.gov.in/>
3. MIT Open Course Ware - Massachusetts Institute of Technology, <https://ocw.mit.edu/>
4. Coursera, <https://www.coursera.org/in>
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