

गुरु घासीदास विश्वविद्यालय  
(केंद्रीय विश्वविद्यालय अधिनियम 2009 अ. 25 से अंतर्गत स्थापित केंद्रीय विश्वविद्यालय)  
कोनी, बिलासपुर - 495009 (छ.ग.)



Guru Ghasidas Vishwavidyalaya  
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)  
Koni, Bilaspur - 495009 (C.G.)

### List of New Course(s) Introduced

Department : **Pure and applied physics**

Programme Name : **B.Sc. Electronics**

Academic Year : **2020-21**

### List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	PS/ELEC/C- 402P	Signals and Systems Lab
02.	PS/ELEC/C- 403P	Electronics Instrumentations Lab
03.	PS/ELEC/C- 501P	Microprocessors and Microcontrollers Lab
04.	PS/ELEC/C- 502P	Electromagnetics Lab
05.	PS/ELEC/C- 601P	Communication Electronics Lab
06.	PS/ELEC/C- 602P	Photonics Lab
07	PS/ELEC/DSE- 603L	Semiconductor Fabrication and Characterization
08	PS/ELEC/DSE- 603P	Semiconductor Fabrication & Characterization Lab

*Umbipatni*

विभागाध्यक्ष/H.O.D.  
शुद्ध एवं अनुप्रयुक्त भौतिकी विभाग  
Dept. of Pure & Applied Physics  
गुरु घासीदास विश्वविद्यालय  
Guru Ghasidas Vishwavidyalaya  
बिलासपुर (छ.ग.)/Bilaspur (C.G.)



## Minutes of Meetings (MoM) of Board of Studies (BoS)

**Academic Year : 2020-21**

**School : School of Physical Sciences**

**Department : Pure and Applied Physics**

**Date and Time : July 13, 2020- 11:30 AM; July 18, 2020 - 5:00 PM**

**Venue : Smart Class Room**

The scheduled meetings of member of Board of Studies (BoS) of Department of Pure and Applied Physics, School of Studies of Physical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, were held to design and discuss the B. Sc (Physics) Second year (III and IV Semesters), scheme and syllabi.

The following members were present in the meeting:

1. Prof. P K. Bajpai
2. Dr. H. S. Tewari
3. Prof. S. B. Kondawar (External Member)
4. Dr. M. N. Tripathi
5. Dr. P. Thakur
6. Dr. R. K. Pandey
7. Dr. T. G. Reddy
8. Dr. R. P. Prajapati
9. Dr. A. K. Gupta
10. Dr. M. P. Sharma
11. Dr. P. Das
12. Dr. T. Trivedi
13. Dr. S. P. Patel
14. Prof. R. Dhar (External member)

The committee discussed and approved the scheme and syllabi. The following new Skill Enhancement courses were added in the B.Sc. (Physics) Second year (V and VI Semesters)

- ❖ Signals and Systems Lab
- ❖ Electronics Instrumentations Lab
- ❖ Microprocessors and Microcontrollers Lab
- ❖ Electromagnetics Lab
- ❖ Communication Electronics Lab
- ❖ Photonics Lab
- ❖ Semiconductor Fabrication and Characterization
- ❖ Semiconductor Fabrication & Characterization LabPhysics Workshop Skills (SEC-1)
- ❖ Electrical Circuits and Network Skills (SEC-2)

  
Signature & Seal of HoD  
विभागाध्यक्ष/H.O.D.  
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**Course Structure & Syllabus of B.Sc. Electronics Session -2019**

**School of Physical Sciences: B.Sc. Hon's (Electronics)**

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
I	Core-1	PS/ELEC/C-101L	Basic Circuit Theory and Network Analysis	4	4
	Core -1 Practical	PS/ ELEC /C-101P	Basic Circuit Theory and Network Analysis Lab	2	4
	Core -2	PS/ ELEC /C-102L	Mathematics Foundation for Electronics	4	4
	Core -2 Practical	PS/ ELEC /C-P-102P	Mathematics Foundation for Electronics Lab	2	4
	Generic Elective -1 (GE- 1A)	PS/ELEC/GE-101	To be opted from the pool*	4	4
	Generic Elective - Practical	PS/ELEC/GE-P-101	GE-101 practical as opted	2	4
	Ability Enhancement Compulsory Course (AECC)	PS/ ELEC /AE-101/EC	English Communication / MIL (Hindi Communication)	4*	4
	ECA	Open elective (Optional)	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
		TOTAL	24	28	
II	Core-3	PS/ ELEC /C-203L	Semiconductor Devices	4	4
	Core -3 Practical	PS/ ELEC /CP-203P	Semiconductor Devices Lab	2	4
	Core -4	PS/ ELEC /C-204L	Applied Physics	4	4
	Core -4 Practical	PS/ ELEC /CP-204P	Applied Physics Lab	2	4
	Generic Elective -2 (GE-1B)	PS/ ELEC /GE-202/	GE-102 (second course of the same subject as opted in GE-101)	4	4
	Generic Elective - Practical	PS/ ELEC /GE-P-202/	GE-202 practical as opted	2	4
	Ability Enhancement Compulsory Course (AECC)	PS/ ELEC /AE-201/ES	Environmental Science	4*	4
	ECA	Optional elective *	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
		Total	24	28	

*Handwritten notes and signatures:*  
Date: 10/11/19  
Checked by: [Signature]  
Principal: [Signature]  
Lijit: [Signature]







	Discipline Specific Elective (DSE-1)	PS/ELEC/DSE-501L	DSE-1	4	4
	DSE-1 - Practical	PS/ELEC/DSE-501P	DSE-1 Lab	2	4
	Discipline Specific Elective (DSE-2)	PS/ELEC/DSE-502L	DSE-2	4	4
	DSE-2 - Practical	PS/ELEC/DSE-502P	DSE-2 Lab	2	4
			TOTAL	24	32
	Core-13	PS/ELEC /C-601L	Communication Electronics	4	4
	Core -13 Practical	PS/ ELEC /C-601P	Communication Electronics Lab	2	4
	Core -14	PS/ ELEC /C-602L	Photonics	4	4
	Core -14 Practical	PS/ ELEC /C-602P	Photonics Lab	2	4
	Discipline Specific Elective (DSE-3)	PS/ELEC/DSE-503L	DSE-3	4	4
	DSE-3 - Practical	PS/ELEC/DSE-503P	DSE-3 Lab	2	4
VI	Discipline Specific Elective (DSE-4) + DSE-4 - Practical <b>Or</b> Dissertation/ Project work followed by seminar	PS/ELEC/PD		4+2=6 <b>Or</b> 5+1=6	8
			TOTAL	24	32
			<b>TOTAL CREDITS</b>	<b>152 + 4 (SI)</b>	

As per UGC CBCS guidelines, University / departments have liberty to offer GE and SEC courses offered by any department to students of other departments. The No. of GE course is four. One GE course is compulsory in first 4 semesters each. In present scheme it is proposed to have minimum two GE courses (from one subject) in first two semesters after which student shall change two GE for another subject in III<sup>rd</sup> and IV<sup>th</sup> semester, so that all the student can have exposure of one additional subject. (Subject to approval by the competent authority).

*Handwritten notes and signatures:*  
18/7/20  
Tushar Singh  
Tushar Singh  
Tushar Singh  
Tushar Singh

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General electives to be offered by Electronics (for Physics/Maths /Electronics/ Comp. Sc. students)

GE/101/ELEC: Basic Circuit Theory and Network Analysis ✓ *for*

GE/102/ ELEC: Mathematics Foundation for Electronics ✗

GE/201/ ELEC: Semiconductor Devices ✗

GE/202/ ELEC: Applied Physics ✓ *for*

List of General elective for Electronics Honors: (1st SEM)

GE/201/Maths

GE/202/Maths

GE/201/PHY

GE/202/PHY

GE/201/COMP. Sc.

GE/202/COMP. Sc.

Skill Enhancement Courses (02 to 04 papers) (Credit: 02 each)- SEC1 to SEC4

1. Design and Fabrication of Printed Circuit Boards (4)
2. Electronics Workshop Skills
3. Electrical circuit network Skills
4. Basic Instrumentation Skills
5. Renewable Energy and Energy harvesting
6. Radiation Safety

*for* *for*  
*for* *for*  
*for* *for*  
*for* *for*  
*for* *for*



**Electromagnetics Lab (using Scilab/ any other similar freeware)**

1. Understanding and Plotting Vectors.
2. Transformation of vectors into various coordinate systems.
3. 2D and 3D Graphical plotting with change of view and rotation.
4. Representation of the Gradient of a scalar field, Divergence and Curl of Vector Fields.
5. Plots of Electric field and Electric Potential due to charge distributions.
6. Plots of Magnetic Flux Density due to current carrying wire.
7. Solutions of Poisson and Laplace Equations – contour plots of charge and potential distributions
8. Introduction to Computational Electromagnetics: Simple Boundary Value Problems by Finite Difference/Finite Element Methods.

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कोनी (छ.ग.)/बिलासपुर  
11/11/2019  
30-4-2019  
20/04/2019  
Tarely  
Shri  
Haran  
Jain  
Shinde  
Sankar  
Usha  
Sankar









## B.Sc. (Honours) Electronics VIth Semester -2020-2021

### Sub: **Photonic Devices and Power Electronics**

**Subject Code: PS/ELEC/C- 602L Credit-04 Theory Lectures (60)**

#### UNIT-I

(17 Lectures)

Classification of photonic devices. Interaction of radiation and matter, Radiative transition and optical absorption. Light Emitting Diodes- Construction, materials and operation. Semiconductor Laser- Condition for amplification, laser cavity, hetero structure and quantum well devices. Charge carrier and photon confinement, line shape function. Threshold current.

Photodetectors: Photoconductor. Photodiodes (p-i-n) and Photo transistors, Photomultiplier tube, Solar Cell: Construction, working and characteristics.

#### UNIT-II

(17 Lectures)

LCD Displays: Types of liquid crystals, Principle of Liquid Crystal Displays, advantages over LED displays.

Introduction to Fiber Optics: Evolution of fiber optic system- Element of an Optical Fiber Transmission link, Optical Fiber Modes and Configurations - Mode theory of Circular Wave guides, Linearly Polarized Modes, Single Mode Fibers, Graded Index fiber structure.

#### UNIT-III

(12 Lectures)

Introduction to family of thyristors. Silicon Controlled Rectifier (SCR)- structure, I-V characteristics, Turn-On and Turn-Off characteristics. Diac and Triac- Basic structure, working and V-I characteristics.

Insulated Gate Bipolar Transistors (IGBT): Basic structure, I-V Characteristics, switching characteristics, device limitations and safe operating area (SOA).

#### UNIT-IV

(12 Lectures)





**B.Sc. (Honours) Electronics VI<sup>th</sup> Semester -2020-2021**

**Sub: Photonic Devices and Power Electronics Lab**

**Subject code: PS/ELEC/C- 602P**

**Credit-02**

1. Diffraction experiments using a laser.
2. To determine characteristics of (a) LEDs, (b) Photo voltaic cell and (c) Photo diode.
3. To study the Characteristics of LDR and Photodiode with (i) Variable Illumination intensity, and (ii) Linear Displacement of source.
4. To measure the numerical aperture of an optical fibre.
5. Output and transfer characteristics of a power MOSFET.
6. Study of I-V characteristics of SCR.
7. SCR as a half wave and full wave rectifiers with R and RL loads.

विभागाध्यक्ष, P.C.O.B.  
2011-2015  
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Pand  
20-4-2019  
20/4/2019  
Shree  
Shri  
Hem  
Jain  
Shinde  
Sandeep  
Usha





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**B.Sc. (Honours) Electronics VI<sup>th</sup> Semester -2020-2021**

**Sub: DSE-3( Semiconductor Fabrication & Characterization)**

**Subject Code: PS/ELEC/DSE- 603L    Credit-04    Theory Lectures (60)**

### **Unit-I Crystal Growth**

Introduction, Semiconductor Materials, Semiconductor Devices, Silicon Crystal Growth from the melt, Starting Material, The Czochralski Technique, Distribution of Dopant, Effective Segregation Coefficient, Silicon float Zone Process, GaAs Crystal Growth techniques, starting materials, Bridgman techniques for GaAs crystal growth, Wafer shaping, crystal defects

### **Unit-II Silicon Oxidation**

Introduction, Thermal oxidation process, kinetics of growth, Thin oxide growth, Impurity redistribution during oxidation, Masking properties of silicon dioxide, oxide quality, oxide thickness characterization, concept of oxidation simulation

### **Unit-III Photolithography**

Introduction, optical lithography, The clean room, exposure tools, masks, photoresist, pattern transfer, Resolution Enhancement Techniques, Electron beam lithography, Electron Resist, The Proximity Effect, Ion beam lithography

### **Unit-IV Etching, Diffusion, Ion Implantation and Metallization**

Wet chemical etching: Silicon etching, Silicon dioxide etching, Dry etching: fundamentals of plasma, etch mechanism, Reactive ion etching

Diffusion, Basic Diffusion Process, Diffusion equation, measurement of resistivity using four point probes, introduction of Ion Implantation, Annealing process, Metallization and Introduction of Process Integration

### **Reference books:**



1. Introduction to Microelectronic Fabrication, R.C. Jaeger, Modular Series on Solid State Devices, Volume V, Addison-Wesley, 1988
2. Principles of Semiconductor Devices, © Bart Van Zeghbroeck, 1997
3. The science and Engineering of Microelectronic Fabrication, S. Campbell, Oxford University Press, 1996.
4. Semiconductor Devices - Physics and Technology, S.M. Sze, Wiley and Sons, 1985.
5. Semiconductor Intergrated Circuit Processing Technology, W.R. Runyan and K.E. Bean, Addison-Wesley, 1990.
6. Solid State Electronic Devices, Fourth edition, B.G. Streetman, Prentice Hall, 1995.
7. Modular series on solid state devices, Pierret and Neudeck, Addison Wesley, 1989.
8. Semiconductor Physics and Devices, Second edition, D. Neamen, Irwin, 1997.
9. Fundamentals of Semiconductor Fabrication – Gary S.May and S.M. Sze, Wiley and Sons, 2012
10. Ludmila Eckertova, Physics of Thin films, 2nd Edition, Plenum Press (1986). 3.

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20/4/2019  
25/4/2019  
20/4/2019

Shir  
Treshy  
Jain  
Htan  
Sindhi  
Sylb  
Sylb

