गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
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List of New Course(s) Introduced

Department	:	*Pure and applied physics*

Programme Name	:	*B.Sc. Electronics*

Academic Year : 2019-20

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	PS/ELEC/C- 301P	Electronic Circuits Lab
02.	PS/ELEC/C- 302P	Digital Electronics and VHDL Lab
03.	PS/ELEC/C- 303P	C Programming and Data Structures Lab
04.	PS/ELEC/C- 401P	Operational Amplifiers and Applications Lab
05	PS/ELEC/C- 403P	Electronics Instrumentations Lab
06.	PS/ELEC/C- 303L	C Programming and Data Structures Lab

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

Academic Year : **2018-19**

School	:	*School of Physical Sciences*
Department	:	*Pure and Applied Physics*

Date and Time :	*July 13, 2018 – 11:30 AM; July 18, 2018 – 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 Skill Enhancement courses were added in the B. Sc. (Physics) Second year (III and IV Semesters):

- ❖ Electronic Circuits Lab
- ❖ Digital Electronics and VHDL Lab
- ❖ C Programming and Data Structures Lab
- ❖ Operational Amplifiers and Applications Lab
- ❖ Electronics Instrumentations Lab

Signature & Seal of HoD

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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
	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
I	Generic Elective -1 (GE- IA)	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
	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-IB)	PS/ ELEC /GE-202/	GE-102 (second course of the same subject as opted in GE-101	4	4
II	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

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SUMMER Internship: 15 days		Optional elective	Swayam Swachhta / NSS / Industrial/ others	2	100
	Core-5	PS/ ELEC /C-301L	Electronic Circuits	4	4
	Core -5 Practical	PS/ ELEC /C-301P	Electronic Circuits Lab	2	4
	Core -6	PS/ ELEC /C-302L	Digital Electronics and VHDL	4	4
	Core -6 Practical	PS/ ELEC /C-302P	Digital Electronics and VHDL Lab	2	4
III	Core - 7	PS/ ELEC /C-303L	C Programming and Data Structures	4	4
	Core – 7 Practical	PS/ ELEC /C-303P	C Programming and Data Structures Lab	2	4
	Generic Elective -3 (GEII-A)		To be opted from the pool of GE	4	4
	Generic Elective - Practical			2	4
	Skill Enhancement Course (SEC - 1)		To be opted from the pool of SE courses**	4*	2 (4)
			Total	28	34
	Core-8	PS/ ELEC /C-401L	Operational Amplifiers and Applications	4	4
	Core -8 Practical	PS/ ELEC /C-401P	Operational Amplifiers and Applications Lab	2	4
	Core -9	PS/ ELEC /C-402L	Signals and Systems	4	4
	Core -9 Practical	PS/ ELEC /C-402P	Signals and Systems Lab	2	4
IV	Core - 10	PS/ ELEC /C-403L	Electronic Instrumentation	4	4
	Core -10 Practical	PS/ ELEC /C-403P	Electronic Instrumentation Lab	2	4
	Generic Elective -4 (GEII-B)		To be opted from the pool of Generic courses	4	4
	Generic Elective - Practical			4	4
	Skill Enhancement Course (SEC -2)		To be opted from the pool of SE courses	4*	2 (4)
			TOTAL	28	34
SUMMER Internship: 15 days		Optional elective	Swayam Swachhta / NSS / Industrial/ others	2	100
	Core-11	PS/ ELEC /C-501L	Microprocessors and Microcontrollers	4	4
V	Core -11 Practical	PS/ ELEC /C-501P	Microprocessors and Microcontrollers Lab	2	4
	Core -12	PS/ ELEC /C-502L	Electromagnetics	4	4
	Core -12 Practical	PS/ ELEC /C-502P	Electromagnetics Lab	2	4

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	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 Or Dissertation/ Project work followed by seminar	PS/ELEC/PD		4+2=6 Or 5 +1=6	8
			TOTAL	24	32
			TOTAL CREDITS	152 + 4 (SI)	

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 IIIrd and IVth semester, so that all the student can have exposure of one additional subject. **(Subject to approval by the competent authority).**

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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

GE/102/ ELEC: Mathematics Foundation for Electronics

GE/201/ ELEC: Semiconductor Devices

GE/202/ ELEC: Applied Physics

List of General elective for Electronics Honors: (Ist 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

Electronics Circuits Lab
(Hardware and Circuit Simulation Software)
60 Lectures

Objective - To learn the characteristics of FET in common source mode, of half as well as full wave rectifiers, of regulated powersupply, of common Emitter based amplifier, of class A, Class B amplifier and of oscillators such as Colpitt and Hartley.

1. Study of the half wave rectifier and Full waverectifier.
2. Study of power supply using C filter and Zenerdiode.
3. Designing and testing of 5V/9 V DC regulated power supply and find itsload-regulation
4. Study of clipping and clamping circuits.
5. Study of Fixed Bias, Voltage divider and Collector-to-Base bias Feedback configuration for transistors.
6. Designing of a Single Stage CEamplifier.
7. Study of Class A, B and C PowerAmplifier.
8. Study of the Colpitt'sOscillator.
9. Study of the Hartley'sOscillator.
10. Study of the Phase ShiftOscillator
11. Study of the frequency response of Common Source FETamplifier.

Outcomes – students will be learn basic function of single stage amplifier, multistage amplifier and power Amplifier and their working principle.

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Guru Ghasidas Vishwavidyalaya

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Digital Electronics and Verilog/VHDL Lab

(Hardware and Circuit Simulation Software)

60 lectures

Objective –
- To learn Hardware Descriptive Language (Verilog/VHDL)
- To make the student learn and understand the basics of Logic Gates with CMOS such as NAND, NOR gates and flip flop.

1. To verify and design AND, OR, NOT and XOR gates using NAND gates.
2. To convert a Boolean expression into logic gate circuit and assemble it using logic gateIC's.
3. Design a Half and FullAdder.
4. Design a Half and FullSubtractor.
5. Design a seven segment displaydriver.
6. Design a 4 X 1 Multiplexer usinggates.
7. To build a Flip- Flop Circuits using elementary gates. (RS, Clocked RS,D-type).
8. Design a counter using D/T/JKFlip-Flop.
9. Design a shift register and study Serial and parallel shifting ofdata.

Experiments in Verlog/VHDL
1. Write code to realize basic and derived logicgates.
2. Half adder, Full Adder using basic and derivedgates.
3. Half subtractor and Full Subtractor using basic and derivedgates.
4. Clocked D FF, T FF and JKFF (with Resetinputs).
5. Multiplexer (4x1, 8x1) and Demultiplexer using logicgates.
6. Decoder (2x4, 3x8), Encoders and PriorityEncoders.
7. Design and simulation of a 4 bitAdder.
8. Code converters (Binary to Gray and viceversa).
9. 2 bit Magnitudecomparator.
10. 3 bit Ripplecounter.

Outcomes -
- Verifying the concepts of gates, flip flop,adder and subtractor.
- Understanding the logic gate experimentsin Verilog/VHDL.

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C Programming and Data Structures Lab
60 Lectures

Objective-

- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

1. Generate the Fibonacci series up to the given limit N and also print the number of elements in the series.
2. Find minimum and maximum of Nnumbers.
3. Find the GCD of two integernumbers.
4. Calculate factorial of a givennumber.
5. Find all the roots of a quadratic equation $Ax^2 + Bx + C = 0$ for non – zero coefficients A, B and C. Else reporterror.
6. Calculate the value of sin (x) and cos (x) using the series. Also print sin (x) and cos (x) value using library function.
7. Generate and print prime numbers up to an integerN.
8. Sort given N numbers in ascendingorder.
9. Find the sum & difference of two matrices of order MxN andPxQ.
10. Find the product of two matrices of order MxN andPxQ.
11. Find the transpose of given MxNmatrix.
12. Find the sum of principle and secondary diagonal elements of the given MxNmatrix.
13. Calculate the subject wise and student wise totals and store them as a part of thestructure.
14. Maintain an account of a customer usingclasses.
15. Implement linear and circular linked lists using single and doublepointers.
16. Create a stack and perform Pop, Push, Traverse operations on the stack using Linear Linkedlist
17. Create circular linked list having information about a college and perform Insertion at front, Deletion atend.
18. Create a Linear Queue using Linked List and implement different operations such as Insert, Delete, and Display the queueelements.
19. Implement polynomial addition and subtraction using linkedlists.
20. Implement sparse matrices using arrays and linkedlists.
21. Create a Binary Tree to perform Tree traversals (Preorder, Postorder, Inorder) using the concept of recursion.
22. Implement binary search tree using linked lists. Compare its time complexity over that of linear search.
23. Implement Insertion sort, Merge sort, Bubble sort, Selectionsort.

Outcomes -

- Develop programs using the basic elements like control statements, Arrays and Strings
- Students will understand basics of numerical analysis such as finding maximum and minimum number, factorialof a number, numbers in ascending order, sum as well as difference of matrices, etc.

Objective-

- To design and analyse of op-ampamplifiers,
- To study characteristics of multivibratorusing IC555.

1. Study of op-amp characteristics: CMRR and Slewrate.
2. Designing of an amplifier of given gain for an inverting and non-inverting configuration using an op-amp.
3. Designing of analog adder and subtractorcircuit.
4. Designing of an integrator using op-amp for a given specification and study its frequencyresponse.
5. Designing of a differentiator using op-amp for a given specification and study its frequencyresponse.
6. Designing of a First Order Low-pass filter usingop-amp.
7. Designing of a First Order High-pass filter usingop-amp.
8. Designing of a RC Phase Shift Oscillator usingop-amp.
9. Study of IC 555 as an astablemultivibrator.
10. Study of IC 555 as monostablemultivibrator.
11. Designing of Fixed voltage power supply using IC regulators using 78 series and 79series

Outcomes - students will be able to use OP Amp to generate sine waveform, Square wave form, Triangular wave forms.

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<mark>**Electronic Instrumentation Lab**</mark>

<mark>**60 Lectures**</mark>

Objective –
- To provide fundamental concepts of control system such as mathematical modelling, time response and frequency response.
- To develop concepts of stability and its assessment criteria.

1. Design of multi range ammeter and voltmeter usinggalvanometer.
2. Measurement of resistance by Wheatstone bridge and measurement of bridgesensitivity.
3. Measurement of Capacitance byde'Sautys.
4. Measure of low resistance by Kelvin's doublebridge.
5. To determine the Characteristics of resistance transducer - Strain Gauge (Measurement of Strain using half and fullbridge.)
6. To determine the Characteristics ofLVDT.
7. To determine the Characteristics of Thermistors andRTD.
8. Measurement of temperature by Thermocouples and study of transducers like AD590 (two terminal temperature sensor), PT-100, J- type,K-type.
9. To study the Characteristics of LDR, Photodiode, andPhototransistor:
   (i) VariableIllumination.
   (ii) LinearDisplacement.
10. Characteristics of one Solid State sensor/ Fiber opticsensor

Outcomes - After successful completion of the course student will be able to
- Students will be able to explain principle of operation for various sensors.
- Students will be able to describe functional blocks of data acquisition system.

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C Programming and Data Structures
(Credits: Theory-04, Practicals-02)

Ojective-

- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

Theory Lectures 60

Unit-1 (12 Lectures): **C Programming Language**: Introduction, Importance of C, Character set, Tokens, keywords, identifier, constants, basic data types, variables: declaration & assigning values. Structure of C program
Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, expressions and evaluation of expressions, type cast operator, implicit conversions, precedence of operators. Arrays-concepts, declaration, accessing elements, storing elements, two-dimensional and multi-dimensional arrays. Input output statement and library functions (math and string related functions).

Unit-2 (19Lectures): **Decision making, branching & looping:** Decision making, branching and looping: if, if-else, else-if, switch statement, break, for loop, while loop and do loop. Functions: Defining functions, function arguments and passing, returning values from functions. **Structures:** defining and declaring a structure variables, accessing structure members, initializing a structure, copying and comparing structure variables, array of structures, arrays within structures, structures within structures, structures and functions. Pointers. **Introduction to C++:** Object oriented programming, characteristics of an object-oriented language.

Unit-3 (15 Lectures): **Data Structures**: Definition of stack, array implementation of stack, conversion of infix expression to prefix, postfix expressions, evaluation of postfix expression. Definition of Queue, Circular queues, Array implementation of queues.Linked List and its implementation.

Unit-4(14 Lectures): **Searching and sorting:** Insertion sort, selection sort, bubble sort, merge sort, linear
Search, binary search **Trees :**Introduction to trees, Binary search tree, Insertion and searching in a BST.
Outcomes - Students will able to select appropriatedata structures as applied to specified problem definition.
References:

1. YashavantKanetkar, Let Us C , BPBPublications
2. Programming in ANSI C, Balagurusamy, 2nd edition,TMH.
3. Byron S Gottfried, Programming with C , SchaumSeries
4. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, PrenticeHall
   .