ORIGINAL

DEPARTMENT OF PHYSICS

COURSE CURRICULUM & MARKING SCHEME

B.Sc. III & IV Semester

ELECTRONICS

(Based on Choice Based Credit System)

SESSION : 2023-24

ESTD : 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A+, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

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Govt. V.Y.T. PG Autonomous College, Durg

(Erstwhile: Govt. Arts & Science College, Durg)

DEPARTMENT OF PHYSICS (ELECTRONICS)

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG

Approved syllabus for B.Sc. Electronics by the members of Board of Studies for the Session 2023-24

Under Graduate Programme in Electronics

The syllabus with the paper combinations is as under

B.Sc. Semester I & II:

Semester I	Credits	Semester II	Credits
BEL 101: Network Analysis And Analog Electronics	03	**BEL 201:** Linear And Digital Integrated Circuits	03
BELL 101: Network Analysis And Analog Electronics Lab	01	**BELL 201:** Linear And Digital Integrated Circuits Lab	01
BELSE 01: Cyber Security	01	**BELSE 02:** Arduino Software	01
BELSEL 01: Cyber Security Lab	01	**BELSEL 02:** Arduino Software Lab	01

B.Sc. Semester III & IV:

Semester III	Credits	Semester IV	Credits
BEL 301: Microprocessor and Interfacing	03	**BEL 401:** Communication Electronics	03
BELL 301: Microprocessor and Interfacing Lab	01	**BELL 401:** Communication Electronics Lab	01
BELSE 01: Cyber Security	01	**BELSE 02:** Arduino Software	01
BELSEL 01: Cyber Security Lab	01	**BELSEL 02:** Arduino Software Lab	01
BEL 302: Numerical Analysis	04	**BEL 402:** Computer Networks	04

Govt. V.Y.T. PG Autonomous College, Durg

(Erstwhile: Govt. Arts & Science College, Durg)

The syllabus for B.Sc. ELECTRONICS is hereby approved for the session 2023-24.

Marking Scheme

4 Yr UG Program B.Sc. with Electronics (CBCS Pattern)

Session 2023-24

B.Sc. Semester I &II

Course. Type	Course Code	Marks	
		Max	Min
DSC	BEL101	75	30
DSC	BELL101	25	10
DSC	BEL201	75	30
DSC	BELL201	25	10
SEC	BELSE 01	25	10
SEC	BELSEL 01	25	10
SEC	BELSE 02	25	10
SEC	BELSEL 02	25	10

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B.Sc. Semester III &IV

Course. Type	Course Code	Marks	
		Max	Min
DSC	BEL301	75	30
DSC	BELL301	25	10
DSC	BEL401	75	30
DSC	BELL401	25	10
SEC	BELSE 01	25	10
SEC	BELSEL 01	25	10
SEC	BELSE 02	25	10
SEC	BELSEL 02	25	10
DSE (If opted)	BEL 302	100	40
DSE (If opted)	BEL 402	100	40

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Sample Grade Sheet

Courses	Credit Ci	Marks	Marks obtained	% Marks Obtainted	Grade Point Gi	CiGi	SGPA
Phy	4	50	30	60	7	28	
Elex	4	50	30	60	7	28	
Maths	4	50	30	60	7	28	
Phy Lab	2	50	30	60	6	12	
Elex Lab	2	50	30	60	6	12	6.92
Maths Lab	2	50	30	60	6	12	
Hindi	2	50	30	60	7	14	
Eng	2	50	30	60	7	14	
SEC1	2	50	40	80	9	18	
Total	**24**	**450**	**280**	**560**	**62**	**166**	

CGPA of an Academic Yr = SGPA1 +AGPA2/ 2 or (SGPA1 + SGPA2+.....SGPAn)/n

Where n is total number of semesters

Question Paper Format and Distribution of marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into five units, each consisting of three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions.
3. Section B shall contain short answer type questions.
4. Section C shall contain long answer/descriptive type questions.
5. Part A of each unit shall be compulsory. However, internal choices may be given in Part B and C.
6. 20 % out of total marks obtained by the students in each paper in internal examinations will be added to 80 % of marks obtained in each paper of end semester examination.

Total Marks Obtained= 20 % of internal assessments + 80 % of ESE

7. The scheme of marks should be as follows :

END SEMESTER EXAMIBNATIONS

Question Type	MM 60 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)
A (Very short Answer)	1x10 = 10	1x10 = 10
B (Short Answer)	3x5 = 15	3X5 = 15
C (Long Answer)	7x5 = 35	5X5=25

स्नातक कक्षाओं के लिए प्रश्न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्रश्न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।
2. खण्ड अ में अतिलघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर) या वस्तुनिश्ठ प्रश्न होंगे। (बहुविकल्पीय प्रश्न नहीं होंगे। 'रिक्त स्थानों की पूर्ति करें ' जैसे प्रश्न भी नहीं होंगे।)
3. खण्ड ब में लघूत्तरी प्रश्न होंगे ।
4. खण्ड स में दीर्घ उत्तरी/निबंधात्मक प्रश्न होंगे।
5. प्रश्नपत्र का प्रारूप एवं अंक विभाजन निम्नानुसार होगा :

सेमेस्टर परीक्षा

प्रश्न का प्रकार	पूर्णांक ६० (अंक x प्रश्नों की संख्या)	पूर्णांक ५०(अंक x प्रश्नों की संख्या)
अतिलघूत्तरी प्रश्न	1x10 = 10	1x10 = 10
लघूत्तरी प्रश्न	3x5 = 15	3X5 = 15
दीर्घ उत्तरी प्रश्न	7x5 = 35	5X5=25

6. आंतरिक मूल्यांकन परीक्षा आयोजित होगी। इस परीक्षा में प्रत्येक प्रश्नपत्र के प्राप्तांक का २०% वार्शिक परीक्षा के प्रत्येक प्रश्नपत्र में प्राप्त अंको के ८०% के साथ जोड़ा जाएगा।

कुल प्राप्त अंक = आंतरिक मूल्यांकन का 20% + ईएसई का 80%

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Syllabus and Marking Scheme for B.Sc. with Electronics

Session 2023-2024

Semester I

Course Type	Title of the Paper	Marks Allotted in Theory	
		Max	Min
DSC	**BEL 101:** Network Analysis And Analog Electronics	60	24
DSC	**BELL 101:** Network Analysis And Analog Electronics Lab	25	10
SEC	**BELSE 01:** Cyber Security	20	8
SEC	**BELSEL 01:** Cyber Security Lab	25	10

GOVT.V.Y.T. PG AUTO. COLLEGE, DURG (C.G.)

SYLLABUS FOR 2023-2024

B.Sc. with Electronics

SEMESTER I

BEL 101: NETWORK ANALYSIS AND ANALOG ELECTRONICS

Credits: Theory-03, Practicals-01

Theory: 45 Hours

Course Outcomes:

After the completion of the course, Students will be able to

CO1: Apply their knowledge in analyzing Circuits by using network theorems.

CO2: Understand working and applications of semiconductor devices.

CO3: Understand the current voltage characteristics of semiconductor devices.

CO4: Know the concept of cascading of the amplifier and their characteristics.

CO5: Know the concept of feedback amplifier and their characteristics.

UNIT-1

Basic Circuit Concepts: Voltage and Current Sources, Review of Resistors, Inductors, Capacitors. Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL).

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. AC applied to Series RC and RL circuits: Impedance of series RC & RL circuits. AC applied to Series and parallel RLC circuit, Series and Parallel Resonance, condition for Resonance, Resonant Frequency, Bandwidth and significance of Quality Factor (Q).

Passive Filters: Low Pass, High Pass.

Network Theorems: Principal of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem.

UNIT-2

Junction Diode and its applications: PN junction diode (Ideal and practical) constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. Idea of static and dynamic resistance, dc load line analysis,
Quiescent (Q) point. Zener diode, Reverse saturation current, Zener and avalanche breakdown. Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple
factor and efficiency. Filter-Shunt capacitor filter, its role in power supply, output waveform, and working. Regulation-Line and load regulation, Zener diode as voltage regulator, and explanation for load and line regulation.

UNIT-3

Bipolar Junction Transistor: CE, CB Characteristics and regions of operation, DC load line, operating point.

Field Effect Transistors: JFET: Construction, Working and Characteristics. MOSFET: Construction, Working and Characteristics.

Power Devices: UJT: Construction, Working and Characteristics. SCR, Diac, Triac: Construction, Working and Characteristics and Applications.

UNIT-4

Amplifiers: Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S. Transistor as a two port network, h-parameter equivalent circuit. Small signal analysis of single stage CE amplifier. Input and Output impedance, Current and Voltage gains. Class A, B and C Amplifiers.

Cascaded Amplifiers: Two stage RC Coupled Amplifier and its Frequency Response.

UNIT-5

Feedback in Amplifiers: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Sinusoidal Oscillators: Barkhausen criterion for sustained oscillations. Phase shift, Weins bridge, Crystal and Colpitt's oscillator. Determination of Frequency and Condition of oscillation.

REFERENCE BOOKS:

1. Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill(2004)
2. Electrical Circuits, M. Nahvi& J. Edminister, Schaum's Outline Series,Tata McGraw-Hill(2005)
3. Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press
4. Network, Lines and Fields, J.D. Ryder, Prentice Hall of India.
5. Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.
6. Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill
7. Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning
8. Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.
9. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill(2001)
10. J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)

BELL 101: NETWORK ANALYSIS AND ANALOG ELECTRONICS LAB
Credit - 01 Lab Hrs : 30

The scheme of practical examination will be as follows-

(i) One experiment 3 HOURS

(ii) Marks

Experiment	15
Viva-voce	05
Sessional	05
Total	25

1. Determination of Energy Band –gap of a Diode.
2. Study of P-N Junction Diode Characteristics.
3. Study of Zener diode characteristics.
4. Study of LED Characteristics.
5. Study of Transistor characteristics in Common Base Mode (CB).
6. Study of Transistor characteristics in Common Emitter Mode (CE).
7. Study of Transistor bias stability.
8. Study of Field Effect Transistor Characteristics.
9. Verification of Norton's Theorem.
10. Verification of Super position Theorem.

Note:

- Other experiments of equal standard may also be set.

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SKILL ENHANCEMENT COURSE (SEC): (Credit: 02 T+L)

BELSE 01: CYBER SECURITY

(Credits: 02 1Th +1Lab) Total : 15 Lect + 30 lab

Course Outcomes:

At the end of this course, Students will be able to:

Understand the issues of cyber security.

Learn the techniques of for encryption and Steganography.

Familiarize with cyber security law.

Introduction of Cyber security: Importance of Cyber security, Cyber security Fundamentals

Cyber Attacks: Various types of Cyber attacks

Seven Layers of Cyber Security: Brief introduction of each layer

Cyber-Attacker Actions: Active Attacks and Passive Attacks

Need of Security policies

Cyber Space: Regulations, NIST Compliance

Indian Cyber Space: National cyber security policy

Cyber Forensic: Digital forensics, the need for computer forensics, cyber forensics and digital evidence

Cryptography: Information Security, Introduction to Cryptography

Image Steganograpy: Introduction, Difference between Cryptography, Steganography and Watermarking

BELSEL 01: CYBER SECURITY LAB

1. Write a programme to hide text in row in an Image.
2. Write a programme to hide text in column in an Image.

References:

1. "Cryptography and Network Security - Principles and Practice", by William Stallings (Pearson) 2017
2. "Cyber Security", by Nina Godbole and Sunit Belapure (Wiley) 2011.
3. " Investigator's Guide to Steganography", by Gregory Kipper, Auerbach Publications, 2003

Name and Signatures

V.C. Nominee	**Departmental members**
Subject Expert	**1.H.O.D/ Dr. Jagjeet Kaur Saluja**.....
Subject Expert.....	**2. Dr.R.S.Singh**.....
Alumni (member).....	**3. Dr. Anita Shukla**.....
Prof. from other Dept. Of Sc. Faculty	**4. Mrs. Siteshwari Chandrakar**.....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra**.....
	6. Dr. Kusumanjali Deshmukh.....

Govt. V.Y.T. PG Autonomous College, Durg

(Erstwhile: Govt. Arts & Science College, Durg)

Syllabus and Marking Scheme for B.Sc. with Electronics

Session 2023-2024

Semester II

Course Type	Title of the Paper	Marks Allotted in Theory	
		Max	Min
DSC	**BEL 201:** Linear And Digital Integrated Circuits	60	24
DSC	**BELL 201:** Linear And Digital Integrated Circuits Lab	25	10
SEC	**BELSE 02:** Arduino Software	20	8
SEC	**BELSEL 02:** Arduino Software Lab	25	10

GOVT.V.Y.T. PG AUTO. COLLEGE, DURG (C.G.)

SYLLABUS FOR 2023-2024

B.Sc. with Electronics

SEMESTER II

BEL 201: LINEAR AND DIGITAL INTEGRATED CIRCUITS

Credits: Theory-03, Practicals-01

Theory: 45 Hours

Course Outcomes:

After the completion of the course, Students will be able to

CO1: Define the basic concepts related to Op-amp and explain the working of op-amp based circuits.

CO2: Understand fundamentals of Number Systems, Boolean algebra and minimization techniques.

CO3: Design combinational digital circuits.

CO4: Design sequential digital circuits.

CO5: Understand working and applications of analog to digital and digital to analog converters.

UNIT-1

Operational Amplifiers (Black box approach): Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Open and closed loop configuration. CMRR. Slew Rate and concept of Virtual Ground.

Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Summing and Difference Amplifier, (3) Differentiator, (4) Integrator, (5) Comparator and (6) Active low pass and high pass.

UNIT-2

Number System and Codes: Decimal, Binary, Octal and Hexadecimal number systems base conversions. Representation of signed and unsigned numbers, BCD code. Binary, octal and hexadecimal arithmetic; addition, subtraction by 2's complement method, multiplication.

Logic Gates and Boolean algebra: Truth Tables of OR, AND, NOT, NOR, NAND, XOR, XNOR, Universal Gates, Basic postulates and fundamental theorems of Boolean algebra.

UNIT-3

Combinational Logic Analysis and Design: 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.

Data processing circuits: Multiplexers, De-multiplexers, Decoders, Encoders.

UNIT-4

Sequential Circuits: SR, D, T and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master-slave JK Flip-Flop.

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel- in-Parallel-out Shift Registers (only up to 4 bits).

UNIT-5

Counters (4 bits): Asynchronous counters: Ring Counter, Decade Counter, Synchronous Counter: Decade counter

D-A Conversion: 4 bit binary weighted and R-2R Ladder converters

A-D Conversion::- successive approximation converters, Counter Type Converter

REFERENCE BOOKS:

1. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall
2. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford UniversityPress.
3. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed.,2011,Tata McGraw
4. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
5. Digital Circuits and systems, Venugopal, 2011, Tata McGrawHill.
6. Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI Learning.
7. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia(1994)
8. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill(1994)

BELL 201: LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB
Credit - 01 Lab Hrs : 30

The scheme of practical examination will be as follows-

(i) One experiment 3 HOURS

(ii) Marks

Experiment	15
Viva-voce	05
Sessional	05
Total	25

1. To design inverting amplifier using Op-amp 741 for DC voltage and calculate the voltage gain.
2. To design non-inverting amplifier using Op-amp 741 for DC voltage and calculate the voltage gain.
3. To investigate the use of an Op-amp as an Integrator.
4. Design a digital to Analog convertor (DAC) of given specifications.
5. Design a Analog to Digital Convertor (ADC) of given specification.
6. Verification of Truth table of basic logic gates.
7. Verification of De Morgan's theorem.
8. Study of half adders and full adders using IC's
9. Study of RS, D and T flip-flops.
10. Study of JK master slave flips flop.

Note:

- Other experiments of equal standard may also be set.

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SKILL ENHANCEMENT COURSE (SEC) : (Credit: 02 --T+L)

BELSE 02: ARDUINO SOFTWARE

(Credits: 02 1Th +1Lab) Total : 15 Lect + 30 lab

Course Outcomes:

At the end of this course, Students will be able to:

Design circuits using Arduino software and simulate it.

- Introduction to the Arduino Board
- Digital Pins
- Analog Pins
- Power Pins
- Other Pins
- Introduction to Basic, Digital, Analog and Communication Commands.
- Installation
- Implementation of software for circuit designing.

BELSEL 02: ARDUINO SOFTWARE LAB

1. Experiment to glow the LED using Arduino Programming.
2. Determination of resistance value of unknown resistor using Arduino Programming.

References:

1. ARDUINO PROJECT HANDBOOK, Mark Geddes, San Francisco

Name and Signatures

Name and Signatures

V.C. Nominee	**Departmental members**
Subject Expert 11/3/2023	**1.H.O.D/ Dr. Jagjeet Kaur Saluja**..... 2023
Subject Expert.....	**2. Dr.R.S.Singh**.....
Alumni (member).....	**3. Dr. Anita Shukla**.....
Prof. from other Dept. Of Sc. Faculty	**4. Mrs. Siteshwari Chandrakar**.....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra**.....
	6. Dr. Kusumanjali Deshmukh.....

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Syllabus and Marking Scheme for B.Sc. with Electronics

Session 2023-2024

Semester III

Course Type	Title of the Paper	Marks Allotted in Theory	
		Max	Min
DSC	**BEL 301:** Microprocessor and Interfacing	60	24
DSC	**BELL 301:** Microprocessor and Interfacing Lab	25	10
SEC	**BELSE 01:** Cyber Security	20	08
SEC	**BELSEL 01:** Cyber Security Lab	25	10
DSE	**BEL 302:** Numerical Analysis	80	32

GOVT.V.Y.T. PG AUTO. COLLEGE, DURG (C.G.)

SYLLABUS FOR 2023-2024

B.Sc. with Electronics

SEMESTER III

BEL 301: MICROPROCESSOR AND INTERFACING

Credits: Theory-03, Practicals-01

Theory: 45 Hours

Course Outcomes:

After the completion of the course, Students will be able to

CO1: Define the basic hardware and software concepts related to Microprocessor.

CO2: Understand basic architecture of 8085 microprocessor.

CO3: Understand the instruction set and write programs in assembly language.

CO4: Understand Stack, Subroutines & Interrupts of 8085 microprocessor.

CO5: Interface 8085 microprocessor with memory and common peripheral devices.

UNIT-1

Introductions To Microprocessor, Hardware Concepts: Block diagram of Microprocessor System, Input, Output devices, Memory (Idea of RAM and ROM), Mapping techniques, Classification of microprocessors (mention of different microprocessors being used).

Software Concepts: Data, Instruction, Program Concepts, Assemblers, Interpreter, and Compilers.

UNIT-2

Microprocessor 8085: Features, Architecture, General purpose registers, register pairs, flags, stack pointer, program counter, types of buses. Multiplexed address and data bus, generation of control signals, pin description of microprocessor 8085.

Timing Cycle: T-States, Machine Cycle: - Read cycle, Write cycle. Timing Diagram of MOV and MVI.

UNIT-3

8085 Instructions: Operation Code, Operand & Mnemonics. Instruction Set of 8085, Instruction Classification, Addressing Modes, Instruction Format. Data Transfer Instructions, Arithmetic Instructions, Increment & Decrement Instructions, Logical Instructions, Branch Instructions. Assembly Language Programming Examples.

UNIT-4

Stack, Subroutines & Interrupts.Stack & Subroutines: Concept of Stack & Subroutines, Call & Return Instructions. Software Delays.

Interrupts: Types Of Interrupts - Hardware & Software Interrupts; Maskable & Non Maskable Interrupts, Vectored & Non Vectored Interrupts.

UNIT-5

Interfacing: Memory Interfacing, PPI 8255: Features of 8255, Pin configuration of 8255, Functional block diagram of 8255; PIC 8259: Features of 8259, Pin configuration of 8259, Functional block diagram of 8259; 8279 (Keyboard & Display Controller): Pin Description & block diagram of 8279; Programmable DMA controller 8257: Pin Description & block diagram of 8257.

REFERENCE BOOKS:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Gaoankar, Prentice Hall.
2. Introduction To Microprocessor Mathur, Aditya P., Tata Mc Graw Hills Publication, 1st ,1990.
3. Introduction To Microprocessor: Software, Hardware Programming Laventhall, Lance A. Prentice-Hall Pub 1st , 1988.
4. Microprocessor And Interfacing, Douglus V. Hall, Mc. Graw Hill Publication.
5. Microprocessors & Fundamentals, B. Ram, Dhanpat Rai & Sons Publication.
6. 8 Bit Microprocessr, Late V. J. Vibhute, P.B. Borole, Tech-Max Publication.

BELL 301: MICROPROCESSOR AND INTERFACING LAB

Credit - 01 Lab Hrs : 30

The scheme of practical examination will be as follows-

(i) One experiment 3 HOURS

(ii) Marks

Experiment	15
Viva-voce	05
Sessional	05
Total	25

1. Write a program to add two 8-bit numbers.
2. Write a program to subtract two 8 bit numbers.
3. Write a program to multiply two 8 bit numbers.
4. Write a program to divide two 8 bit numbers.
5. Write a program to add ten data bytes.
6. Write a program to transfer a block of data in forward order.
7. Write a program to transfer a block of data in reverse order.
8. Write a program to arrange data in ascending order.
9. Write a program to arrange data in descending order.
10. Write a program to find largest number in an array.

Note:

- Other experiments of equal standard may also be set.

SKILL ENHANCEMENT COURSE (SEC): (Credit: 02 T+L)

BELSE 01: CYBER SECURITY

(Credits: 02 1Th +1Lab) Total : 15 Lect + 30 lab

Course Outcomes:

At the end of this course, Students will be able to:

Understand the issues of cyber security.

Learn the techniques of for encryption and Steganography.

Familiarize with cyber security law.

Introduction of Cyber security: Importance of Cyber security, Cyber security Fundamentals

Cyber Attacks: Various types of Cyber attacks

Seven Layers of Cyber Security: Brief introduction of each layer

Cyber-Attacker Actions: Active Attacks and Passive Attacks

Need of Security policies

Cyber Space: Regulations, NIST Compliance

Indian Cyber Space: National cyber security policy

Cyber Forensic: Digital forensics, the need for computer forensics, cyber forensics and digital evidence

Cryptography: Information Security, Introduction to Cryptography

Image Steganograpy: Introduction, Difference between Cryptography, Steganography and Watermarking

BELSEL 01: CYBER SECURITY LAB

1. Write a programme to hide text in row in an Image.
2. Write a programme to hide text in column in an Image.

REFERENCES BOOKS:

1. "Cryptography and Network Security - Principles and Practice", by William Stallings (Pearson) 2017

2. "Cyber Security", by Nina Godbole and Sunit Belapure (Wiley) 2011.

3. " Investigator's Guide to Steganography", by Gregory Kipper, Auerbach Publications, 2003

BEL 302: NUMERICAL ANALYSIS
Credits: 04 (45 Hrs Th + 15 Hrs tutorials)

Course Outcomes:
After the completion of the course, Students will be able to
CO1: Understand the common numerical methods and how they are used to obtain approximate solutions to mathematical problems.
CO2: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
CO3: Analyze and evaluate the accuracy of common numerical methods.

UNIT-1
Numerical Methods: Floating point, Round-off error, Error propagation, Stability, Programming errors. Solution of Transcendental and Polynomial Equations f(x)=0: Bisection method, Secant and Regula Falsi Methods, Newton Raphson method, Rate of convergence, General Iteration Methods.
UNIT-2
Interpolation and Polynomial Approximations: Taylor Series and Calculation of Functions, Langrange Interpolation, Newton Divided Difference Interpolation (forward and backward difference formulae), Truncation errors.
UNIT-3
Numerical Integration: Trapezoidal Rule, Error bounds and estimate for the Trapezoidal rule,
Simpson's Rule, Error of Simpson's rule.
Numerical Differentiation: Finite difference method and applications to electrostatic
boundary value problems.
UNIT-4
Numerical methods for first order differential equations: Euler-Cauchy Method, Heun's Method, Classical Runge Kutta method of fourth order. Methods for system and higher order equations.
UNIT-5
Numerical Methods in Linear Algebra: Linear systems Ax=B, Gauss Elimination, Partial Pivoting, LU factorization, Doolittle's, Crout's and Cholesky's method. Matrix Inversion, Gauss-Jordon, Iterative Methods: Gauss-Seidel Iteration, Jacobian Iteration.

REFERENCES BOOKS:
1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons (1999).
2. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall India, Third Edition.
3. S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall India (2008).
4. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods: Problems and Solutions, New Age International.
5. B.S. Grewal, Numerical Methods in Engineering and Science with Programs in C and C++, Khanna Publishers.

Govt. V.Y.T. PG Autonomous College, Durg

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Name and Signatures

V.C. Nominee	**Departmental members**
Subject Expert 11/3/2023	**1.H.O.D/ Dr. Jagjeet Kaur Saluja** 7.3.23
Subject Expert..... 11/3/23	**2. Dr.R.S.Singh**.....
Alumni (member).....	**3. Dr. Anita Shukla**.....
Prof. from other Dept. Of Sc. Faculty	**4. Mrs. Siteshwari Chandrakar**.....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra**.....
	6. Dr. Kusumanjali Deshmukh.....

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Syllabus and Marking Scheme for B.Sc. with Electronics

Session 2023-2024

Semester IV

Course Type	Title of the Paper	Marks Allotted in Theory	
		Max	Min
DSC	**BEL 401:** Communication Electronics	60	24
DSC	**BELL 401:** Communication Electronics Lab	25	10
SEC	**BELSE 02:** Arduino Software	20	08
SEC	**BELSEL 02:** Arduino Software Lab	25	10
DSE	**BEL 402:** Computer Networks	80	32

GOVT.V.Y.T. PG AUTO. COLLEGE, DURG (C.G.)

SYLLABUS FOR 2023-2024

B.Sc. with Electronics

SEMESTER IV

BEL 401: COMMUNICATION ELECTRONICS

Credits: Theory-03, Practicals-01

Theory: 45 Hours

Course Outcomes:

After the completion of the course, Students will be able to

CO1: Understand the basics of Amplitude Modulation.

CO2: Understand the basics of Angle Modulation.

CO3: Understand the basics of Analog Pulse Modulation.

CO4: Understand the basics of Digital Pulse Modulation.

CO5: Understand the basics of Optical, satellite Communication

UNIT-1

Amplitude Modulation: Need of Modulation, Amplitude Modulation, Modulation Index and Frequency Spectrum. Generation of AM, Amplitude Demodulation (Diode Detector), Concept Of Double Side Band Suppressed Carrier, Single Side Band Suppressed Carrier, Vestigial Side Band Modulation. Block Diagram of AM Transmitter and Receiver.

UNIT-2

Angle Modulation: Frequency and Phase Modulation, Modulation Index and Frequency Spectrum, Equivalence Between FM and PM, Generation of FM (Direct And Indirect Methods), FM Detector. Block Diagram of FM Transmitter and Receiver, Comparison Between AM, FM and PM.

UNIT-3

Pulse Analog Modulation: Sampling Theorem & Nyquist Rate, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM). Generation and Detection of PAM, PWM, PPM Signals. Multiplexing: Time Division Multiplexing (TDM) & Frequency Division Multiplexing (FDM).

UNIT-4

Digital Pulse Modulation: Need for digital transmission, Pulse Code Modulation. Digital Carrier Modulation Techniques, Sampling. Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK). Phase Shift Keying (PSK) and Binary Phase Shift Keying (BPSK). Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation.

UNIT-5

Optical Communication: Introduction of Optical Fibre, Block Diagram of optical communication system.

Satellite communication: Introduction, need, Geo-synchronous satellite orbits. Geostationary satellite, Advantages of geostationary satellites, Block Diagram of Earth Stations, Uplink and Downlink.

REFERENCE BOOKS:

1. Electronic Communications, D. Roody and J. Coolen, Pearson Education India.
2. Advanced Electronic Communication Systems- Tomasi, 6th Edition, Prentice Hall.
3. Modern Digital and Analog Commuication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press.
4. Electronic Communication systems, G. Kennedy, 3rd Edition. 1999, Tata McGraw Hill.
5. Optical Communication systems-Frenzel, 3rd edition, Mc Graw Hill.
6. Communication Systems, S. Haykin, 2006, Wiley lndia.
7. Electronic Communication system, Blake. Cengage, 5th Edition.
8. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press.

BELL 401: COMMUNICATION ELECTRONICS LAB

Credit - 01 Lab Hrs : 30

The scheme of practical examination will be as follows-

(i) One experiment 3 HOURS

(ii) Marks

Experiment	15
Viva-voce	05
Sessional	05
Total	25

1. Study of Amplitude Modulation.
2. Study of Amplitude Demodulation.
3. Study of Frequency Modulation.
4. Study of Frequency Demodulation.
5. Study of Pulse Amplitude Modulation.
6. Study of TDM, FDM.
7. Study of Pulse Width Modulation.
8. Study of Pulse Position Modulation.
9. Study of Pulse Code Modulation.
10. Study of Amplitude Shift Keying.
11. Study of Phase Shift Keying.
12. Study of Frequency Shift Keying.
13. Study of Delta Modulation.
14. Study of Adaptive Delta Modulation.

Note:

- Other experiments of equal standard may also be set.

SKILL ENHANCEMENT COURSE (SEC) : (Credit: 02 --T+L)

BELSE 02: ARDUINO SOFTWARE

(Credits: 02 1Th +1Lab) Total : 15 Lect + 30 lab

Course Outcomes:

At the end of this course, Students will be able to:

Design circuits using Arduino software and simulate it.

- Introduction to the Arduino Board
- Digital Pins
- Analog Pins
- Power Pins
- Other Pins
- Introduction to Basic, Digital, Analog and Communication Commands.
- Installation
- Implementation of software for circuit designing.

BELSEL 02: ARDUINO SOFTWARE LAB

3. Experiment to glow the LED using Arduino Programming.
4. Determination of resistance value of unknown resistor using Arduino Programming.

References:

1. ARDUINO PROJECT HANDBOOK, Mark Geddes, San Francisco

BEL 402: COMPUTER NETWORKS
Credits: 04 (45 Hrs Th + 15 Hrs tutorials)
Course Outcomes:
After the completion of the course, Students will be able to
CO1: Understand the fundamentals of computer networks and issues involved
CO2: Understand the set of rules and procedures that mediates the exchange of information between communicating devices.

UNIT-1
Data Communications : Components, protocols and standards, Network and Protocol Architecture, Reference Model ISO-OSI, TCP/IP-Overview, topology, transmission mode, digital signals, digital to digital encoding, digital data transmission, DTE-DCE interface, interface standards, modems, cable modem, transmission media- guided and unguided, transmission impairment, Performance, wavelength and Shannon capacity. Review of Error Detection and Correction codes.
UNIT-2
Switching: Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and Datagram approach), message switching. Data Link Layer: Design issues, Data Link Control and Protocols: Flow and Error Control, Stop-and-wait ARQ. Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point-to –Point Access: PPP Point –to- Point Protocol, PPP Stack,
UNIT-3
Medium Access Sub layer: Channel allocation problem, Controlled Access, Channelization, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Token ring, Token Bus, FDDI based LAN, Network Devices-repeaters, hubs, switches bridges.
UNIT-4
Network Layer: Design issues, Routing algorithms, Congestion control algorithms, Host to Host Delivery: Internetworking, addressing and routing, IP addressing (class full & Classless), Subnet, Network Layer Protocols: ARP, IPV4, ICMP, IPV6, ICMPV6.
UNIT-5
Transport Layer: Process to Process Delivery: UDP; TCP, congestion control and Quality of service. Application Layer: Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP), file transfer (FTP), HTTP and WWW.

References
1. S. Tannenbum, D. Wetherall, "Computer Networks", Prentice Hall, Pearson, 5Th Ed
2. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, 4th Ed

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