DEPARTMENT OF PHYSICS

COURSE CURRICULUM & MARKING SCHEME

B.Sc. III, IV, V & VI Semester
ELECTRONICS

(Based on Choice Based Credit System)

SESSION : 2024-25

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)Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in,

Email – autonomousdurg2013@gmail.com

Govt. V.Y.T. PG Autonomous College, Durg
(Chhattisgarh)
(Erstwhile: Govt. Arts & Science College, Durg)

B. Sc. WITH ELECTRONICS

III, IV, V & VI Semester

2024-25

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

Appendix-II (Amended)

UGCF for Multidisciplinary Courses of Study

Sem.	DSC	DSE	GE	AEC	SEC/ Internship/ Apprenticeship / Project/ Dissertation / Community outreach (2)	VAC	Total Credits
I	DSC A 1-(4) DSC B 1-(4) DSC C 1-(4)		Choose one from a pool of courses GE-1 (4)	Choose one from a pool of AEC courses (2)	Choose one from a pool of courses (2)	Choose one from a pool of courses (2)	**22 Credits**
II	DSC A 2-(4) DSC B 2-(4) DSC C 2-(4)		Choose one from a pool of courses GE-2 (4)	Choose one from a pool of AEC courses (2)	Choose one from a pool of courses (2)	Choose one from a pool of courses (2)	**22 Credits**
Students exiting shall be awarded Undergraduate Certificate (in the Field of study/Discipline) after securing the minimum 40 credits in semester I and II							**Total = 44 Credits**
III	DSC A 3-(4) DSC B 3-(4) DSC C 3-(4)	Choose one from a pool of courses DSE A/B/C (4) Or Choose one from a pool of courses GE-3(4)		Choose one from a pool of AEC courses (2)	**Choose one SEC (2) OR** Internship/Apprenticeship/Project/community outreach **(2)**	Choose one from a pool of courses (2)	**22 Credits**
IV	DSC A 4-(4) DSC B 4-(4) DSC C 4-(4)	Choose one from a pool of courses DSE A/B/C (4) Or Choose one from a pool of courses GE-4(4)		Choose one from a pool of AEC courses (2)	**Choose one SEC (2)OR** Internship/Apprenticeship/Project/community outreach **(2)**	Choose one from a pool of courses (2)	**22 Credits**
Students exiling shall be awarded Undergraduate Diploma (in the Field of study/Discipline) after securing the minimum 80 credits on completion of semester IV							**Total = 88 Credits**
V	DSC A 5-(4) DSC B 5-(4) DSC C 5-(4)	Choose two from a pool of courses DSE A/B/C (4+4) OR Choose two from a pool of courses GE-5 (4) & GE-6 (4)			**Choose one SEC (2) OR** Internship/Apprenticeship/Project/community outreach **(2)**		**22 Credits**
VI	DSC A 6-(4) DSC B 6-(4) DSC C 6-(4)	Choose two from a pool of courses DSE A/B/C (4+4) Choose one from a pool of courses GE-7 (4)& GE-8 (4)			Internship/Apprenticeship/Project/community outreach **(2)**		**22 Credits**
Students exiting shall be awarded Bachelor of (in the Field of Multidisciplinary study) in relevant Discipline after securing the minimum 120 credits on completion of semester VI							**Total = 132 Credits**
VII	DSCA/B/C-(4)	Choose Four DSE (4x4) courses **OR** Choose three DSE-(3x4) and one GE-(1x4) course **OR** Choose one DSE (1 x 4) and Three GE (3 x 4) courses **OR** All Four GE 9, 10, 11 & 12 (4x4) (total=16)					**20 credits**
VIII	DSC A/B/C-(4)	Choose Four DSE(4x4) courses **OR** Choose three DSE-(3x4) and one GE-(1x4) course **OR** Choose one DSE -(1x4) and Three GE(4) (3x4) courses **OR** All Four GE 13, 14, 15 & 16 (4x4) (total=16)					**20 credits**
Students shall be awarded Bachelor of (in the Field of Multidisciplinary study) (Honours)in relevant Discipline after securing the minimum 160 credits on completion of Semester VIII OR							**Total = 172 Credits**
VII	DSCA/B/C-(4)	Choose Four DSE(4x4) courses **OR** Choose three DSE-(3x4) and one GE-(1x4) course**OR** Choose one DSE (1 x 4) and Three GE (3 x 4) courses **OR** All Four GE 9, 10, 11 & 12(4x4) (total=16)					**20 credits**
VIII	DSC A/B/C-(4)	Choose one DSE (1 x 4) courses **OR** Choose one GE(1 x 4) course **OR**			**Research Project / Dissertation (12)**		**20 credits**
Students shall be awarded Bachelor of (in the Field of Multidisciplinary study) (Honours with Research) in relevant Discipline after securing the minimum 160 credits on completion of Semester VIII							**Total = 172 Credits**

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

Approved syllabus for Semester and CBCS curriculum of B.Sc. with ELECTRONICS, by the members of Board of Studies for Session 2024-25

Semester III	Semester IV	Semester V	Semester VI	No. of Credits
DSC: BEL301 Microprocessor and Interfacing	DSC: BEL401 Communication Electronics	DSC : BEL501 Industrial Electronics, Information Theory and Coding	DSC : BEL601 Advance Microprocessor and Microcontroller	3
DSC: BELL301 Microprocessor and Interfacing Lab	DSC: BELL401 Communication Electronics Lab	DSC : BELL501 Industrial Electronics, Information Theory and Coding Lab	DSC : BELL601 Advance Microprocessor and Microcontroller Lab	1
DSE: BEL302 Numerical Analysis	DSE: BEL402 Computer Networks	DSE : BEL502 Operational Amplifier	DSE : BEL602 Signals and Systems	3
DSE: BELL302 Numerical Analysis Lab/Tutorial	DSE: BELL402 Computer Networks Lab/Tutorial	DSE : BELL502 Operational Amplifier Lab	DSE : BELL602 Signals and Systems Lab/Tutorial	1
SEC : BELSE101 Cyber Security	SEC : BELSE201 Arduino Software	SEC : BELSE101 Cyber Security	SEC : BELSE201 Arduino Software	1
SEC : BELSEL101 Cyber Security Lab/Project	SEC : BELSEL201 Arduino Software Lab/Project	SEC : BELSEL101 Cyber Security Lab/Project	SEC : BELSEL201 Arduino Software Lab/Project	1

***DSC – Discipline Specific Course**

***GEC – Generic Elective Course**

***DSE – Discipline Specific Elective**

***SEC – Skill Enhancement Course**

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

Absolute Grading System (for conversion of marks into grade points)

Letter Grade	Grade point	Obtained Score
O (Outstanding) 10	10	>90 and =100
A+(Excellent) 9	9	>80 and =90
A(Very Good) 8	8	>70 and =80
B+(Good) 7	7	>60 and =70
B(Above Average) 6	6	>50 and =60
C(Average) 5	5	>40 and =50
P (Pass) 4	4	=40
F(Fail) 0	0	<40
Ab (Absent) 0	0	0

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

Syllabus and Marking Scheme for B.Sc. with Electronics

Session 2024-2025

Semester III

(For Regular Students)

Course Type	Title of the Paper	No. of Credits	Marks Allotted in Theory & Practical			
			SEM. END	INTERNAL ASS.	TOTAL MARKS	
			Max	Max	Max	Min
DSC	**BEL301 :** Microprocessor and Interfacing	3	80	20	100	40
DSC	**BELL301 :** Microprocessor and Interfacing Lab	1	50	-	50	20
DSE	**BEL302 :** Numerical Analysis	3	80	20	100	40
DSE	**BELL302 :** Numerical Analysis Lab/Tutorial	1	50	-	50	20
SEC	**BELSE101 :** Cyber Security	1	25	-	25 + 25 = 50	20
SEC	**BELSEL101 :** Cyber Security Lab/Project	1	25	-		

For ATKT/EX Students

Course Type	Title of the Paper	No. of Credits	Marks Allotted in Theory & Practical			
			SEM. END	INTERNAL ASS.	TOTAL MARKS	
			Max	Max	Max	Min
DSC	**BEL301 :** Microprocessor and Interfacing	3	60	15	75	30
DSC	**BELL301 :** Microprocessor and Interfacing Lab	1	25	-	25	10
DSE	**BEL302 :** Numerical Analysis	3	60	15	75	30
DSE	**BELL302 :** Numerical Analysis Lab/Tutorial	1	25	-	25	10
SEC	**BELSE101 :** Cyber Security	1	20	05	25	10
SEC	**BELSEL101 :** Cyber Security Lab/Project	1	25	-	25	10

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

<table>
<tr><th colspan="5">PART A: INTRODUCTION</th></tr>
<tr><td colspan="2">Program: FYUP
B.Sc. with Electronics</td><td colspan="2">Class: B.Sc. (Maths) Semester - III</td><td>Session: 2024-2025</td></tr>
<tr><td>1</td><td>Course Code</td><td colspan="3">BEL301</td></tr>
<tr><td>2</td><td>Course Title</td><td colspan="3">MICROPROCESSOR AND INTERFACING</td></tr>
<tr><td>3</td><td>Course Type</td><td colspan="3">Discipline Specific Course (DSC)</td></tr>
<tr><td>4</td><td>Course Learning Outcome (CLO)</td><td colspan="3">This Course will enable the students to:
• Define the basic hardware and software concepts related to Microprocessor.
• Understand basic architecture of 8085 microprocessor.
• Understand the instruction set and write programs in assembly language.
• Understand Stack, Subroutines & Interrupts of 8085 microprocessor.
• Interface 8085 microprocessor with memory and common peripheral devices.</td></tr>
<tr><td>5</td><td>Credit Value</td><td>3 Credits</td><td colspan="2">1 credit =15 Hours – Learning and Observation</td></tr>
<tr><td>6</td><td>Total Marks</td><td colspan="2">Maximum Marks : 100</td><td>Minimum Passing Marks: 40</td></tr>
<tr><th colspan="5">PART B: CONTENT OF THE COURSE</th></tr>
<tr><td colspan="5">Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)</td></tr>
<tr><th>Unit</th><th colspan="3">Topics (COURSE CONTENTS)</th><th>No. of Periods</th></tr>
<tr><td>I</td><td colspan="3">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.</td><td>7</td></tr>
</table>

II	**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. **Interrupts:** Types Of Interrupts - Hardware & Software Interrupts; Maskable & Non-Maskable Interrupts, Vectored & Non Vectored Interrupts.	**9**
III	**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.	**11**
IV	**Stack & Subroutines:** Concept of Stack & Subroutines, Call & Return Instructions. Software Delays. **Timing Cycle:** T-States, Machine Cycle: - Opcode fetch cycle, Operand fetch or Memory Read cycle, Memory Write cycle. Timing Diagram of MOV, DCX and MVI.	**9**
V	**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.	**9**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- 8 Bit Microprocessor, Late V. J. Vibhute, P.B. Borole, Tech-Max Publication.
- Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Gaonkar, Prentice Hall.

Reference Books

- Introduction To Microprocessor Mathur, Aditya P., Tata Mc Graw Hills Publication, 1st , 1990.
- Introduction To Microprocessor: Software, Hardware Programming Laventhall, Lance A. Prentice-Hall Pub 1st, 1988.
- Microprocessor And Interfacing, Douglus V. Hall, Mc. Graw Hill Publication.
- Microprocessors & Fundamentals, B. Ram, Dhanpat Rai & Sons Publication.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Comprehensive Evaluation (CCE): **20 Marks**

Semester End Exam (SEE): **80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker** .....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra** ..... **6. Dr. Kusumanjali Deshmukh**.....

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

LAB COURSE

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - III**	**Session: 2024-2025**
1	**Course Code**	**BELL301**		
2	**Course Title**	**MICROPROCESSOR AND INTERFACING LAB**		
3	**Course Type**	**Discipline Specific Course (DSC)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Identify relevant information to supplement to the microprocessor. • Set up programming strategies and select proper mnemonics and run their program on the training kits. • Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison. • Develop testing and experimental procedure on Microprocessor and analyze their operation under different cases. • Primarily via team-based laboratory activities, students will demonstrate the ability to interact effectively on a social and interpersonal level with fellow students**.**		
5	**Credit Value**	**1 Credit**	**1 credit = 30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks: 50**		**Minimum Passing Marks: 20**

PART B: CONTENT OF THE COURSE	
S. No.	**List of Experiments**
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.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- 8 Bit Microprocessor, Late V. J. Vibhute, P.B. Borole, Tech-Max Publication.
- Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Gaonkar, Prentice Hall.
- Microprocessor And Interfacing, Douglus V. Hall, Mc. Graw Hill Publication.
- Microprocessors & Fundamentals, B. Ram, Dhanpat Rai & Sons Publication.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)	**Laboratory performance:** Students are required to perform one experiment, take observation and make calculations in the allotted duration of 2 hours. Viva voce will be based on the experiment performed.

Name & Signature of Members of Board of Studies

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

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - III**	**Session: 2024-2025**
1	**Course Code**	**BEL302**		
2	**Course Title**	**NUMERICAL ANALYSIS**		
3	**Course Type**	**Discipline Specific Elective (DSE)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understand the common numerical methods and how they are used to obtain approximate solutions to mathematical problems. • 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. • Analyze and evaluate the accuracy of common numerical methods.		
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :100**		**Minimum Passing Marks: 40**

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**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.	**13**
II	**Interpolation and Polynomial Approximations:** Taylor Series and Calculation of Functions, Langrange Interpolation, Newton Divided Difference Interpolation (forward and backward difference formulae), Truncation errors.	**9**
III	**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.	**9**

IV	**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.	**7**
V	**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.	**7**
Tutorial Topics	• **Error Analysis:** Floating-point approximations, Significant digits, stability in computation. • **Nonlinear Equations:** Bisection method, Regula-falsi method, Newton-Raphson method, Convergence analysis. • **Direct methods for Linear System of Equations:** Gaussian Elimination method, Partial Pivoting, LU factorization, Operation Counting. • **Iterative Methods for Linear System:** Jacobi Method, Gauss-Seidel Method. • **Numerical Integration:** Trapezoidal rule, Simpson's Rule, error analysis. • **Numerical Methods for ODEs:** Euler Method, Runge Kutta method of order 2 and 4.	**30**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- B.S. Grewal, Numerical Methods in Engineering and Science with Programs in C and C++, Khanna Publishers.

Reference Books

- E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons (1999).
- V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall India, Third Edition.
- S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall India (2008).
- M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods: Problems and Solutions, New Age International.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Comprehensive Evaluation (CCE): **20 Marks**

Semester End Exam (SEE): **80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**

Name & Signature of Members of Board of Studies

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

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

B.Sc. with Electronics

Session 2024-2025

Semester III

SEC (Theory & Practical/Project)

BELSE101: CYBER SECURITY

Credits: 02

Theory – 01

Practical – 01

Lectures: 45 Hours

Theory – 15 Hours

Practical – 30 Hours

Course Outcomes (CO):

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

CO1	**Understand the issues of cyber security.**
CO2	**Learn the techniques of for encryption and Steganography.**
CO3	**Familiarize with cyber security law.**

THEORY – BELSE101: CYBER SECURITY

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.

PRACTICAL/PROJECT – BELSEL101: CYBER SECURITY

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

REFERENCES BOOKS:

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

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker .....
Specialist from Industry.....	5. Dr. Abhishek Kumar Misra .....
	6. Dr. Kusumanjali Deshmukh.....

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

Syllabus and Marking Scheme for B.Sc. with Electronics

Session 2024-2025

Semester IV

(For Regular Students)

Course Type	Title of the Paper	No. of Credits	Marks Allotted in Theory & Practical			
			SEM. END	INTERNAL ASS.	TOTAL MARKS	
			Max	Max	Max	Min
DSC	**BEL401 :** Communication Electronics	3	80	20	100	40
DSC	**BELL401 :** Communication Electronics Lab	1	50	-	50	20
DSE	**BEL402 :** Computer Networks	3	80	20	100	40
DSE	**BELL402 :** Computer Networks Lab/Tutorial	1	50	-	50	20
SEC	**BELSE201 :** Arduino Software	1	25	-	25 + 25 = 50	20
SEC	**BELSEL201 :** Arduino Software Lab/Project	1	25	-		

For ATKT/EX Students

Course Type	Title of the Paper	No. of Credits	Marks Allotted in Theory & Practical			
			SEM. END	INTERNAL ASS.	TOTAL MARKS	
			Max	Max	Max	Min
DSC	**BEL401 :** Communication Electronics	3	60	15	75	30
DSC	**BELL401 :** Communication Electronics Lab	1	25	-	25	10
DSE	**BEL402 :** Computer Networks	3	60	15	75	30
DSE	**BELL402 :** Computer Networks Lab/Tutorial	1	25	-	25	10
SEC	**BELSE201 :** Arduino Software	1	20	05	25	10
SEC	**BELSEL201 :** Arduino Software Lab/Project	1	25	-	25	10

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

<table>
<tr><td colspan="5">PART A: INTRODUCTION</td></tr>
<tr><td colspan="2">Program: FYUP
B.Sc. with Electronics</td><td colspan="2">Class: B.Sc. (Maths) Semester - IV</td><td>Session: 2024-2025</td></tr>
<tr><td>1</td><td>Course Code</td><td colspan="3">BEL401</td></tr>
<tr><td>2</td><td>Course Title</td><td colspan="3">COMMUNICATION ELECTRONICS</td></tr>
<tr><td>3</td><td>Course Type</td><td colspan="3">Discipline Specific Course (DSC)</td></tr>
<tr><td>4</td><td>Course Learning Outcome (CLO)</td><td colspan="3">This Course will enable the students to:
• Understand the basics of Amplitude Modulation.
• Understand the basics of Angle Modulation.
• Understand the basics of Analog Pulse Modulation.
• Understand the basics of Digital Pulse Modulation.
• Understand the basics of Optical and satellite Communication.</td></tr>
<tr><td>5</td><td>Credit Value</td><td>3 Credits</td><td colspan="2">1 credit =15 Hours – Learning and Observation</td></tr>
<tr><td>6</td><td>Total Marks</td><td colspan="2">Maximum Marks :100</td><td>Minimum Passing Marks:40</td></tr>
<tr><td colspan="5">PART B: CONTENT OF THE COURSE</td></tr>
<tr><td colspan="5">Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)</td></tr>
<tr><td>Unit</td><td colspan="3">Topics (COURSE CONTENTS)</td><td>No. of Periods</td></tr>
<tr><td>I</td><td colspan="3">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.</td><td>9</td></tr>
<tr><td>II</td><td colspan="3">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.</td><td>7</td></tr>
</table>

III	**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).	**11**
IV	**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.	**11**
V	**Optical Communication:** Introduction of Optical Fiber, 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.	**7**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- Principle of Communication Systems, H.Taub, D.L. Schilling, G. Saha Mc Graw Hill.
- Optical Communication systems-Frenzel, 3rd edition, Mc Graw Hill.
- Satellite Communication, Dr. D. C. Agrawal, Khanna Publication.

Reference Books

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

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Comprehensive Evaluation (CCE): **20 Marks**

Semester End Exam (SEE): **80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (02 each)	04 x 5 = 20 Marks
	Question - C: Short answer type question	05 x 5 = 25 Marks
	Question -D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 80 Marks**

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker** .....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra** .....
	6. Dr. Kusumanjali Deshmukh.....

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

LAB COURSE

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)** **Semester - IV**		**Session: 2024-2025**
1	**Course Code**	**BELL401**		
2	**Course Title**	**COMMUNICATION ELECTRONICS LAB**		
3	**Course Type**	**Discipline Specific Course (DSC)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Define the fundamentals and functions of various communication systems. • Understand the working operation of analog & digital modulation techniques used in communication systems. • Apply various methods used in communication systems for generation and reception of modulated and demodulated signals. • Analyze the waveforms of various modulation and demodulation techniques.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks: 50**		**Minimum Passing Marks: 20**

PART B: CONTENT OF THE COURSE

S. No.	**List of Experiments**
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.

PART C - LEARNING RESOURCES	
Text Books, Reference Books, Other Resources	
TEXT BOOKS Recommended : • Principle of Communication Systems, H.Taub, D.L. Schilling, G. Saha Mc Graw Hill. **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)**	
PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance:** Students are required to perform one experiment, take observation and make calculations in the allotted duration of 2 hours. Viva voce will be based on the experiment performed.

Name & Signature of Members of Board of Studies

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

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)** **Semester - IV**		**Session: 2024-2025**
1	**Course Code**	**BEL402**		
2	**Course Title**	**COMPUTER NETWORKS**		
3	**Course Type**	**Discipline Specific Elective (DSE)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understand the fundamentals of computer networks and issues involved • Understand the set of rules and procedures that mediates the exchange of information between communicating devices.		
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :100**		**Minimum Passing Marks:40**

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**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.	**10**
II	**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.	**10**

III	**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.	**7**
IV	**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.	**9**
V	**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.	**9**
Tutorial Topics	• **Introduction to Computer Networks:** History, Circuit Switching and Packet Switching. • **TCP/IP Protocol Stack:** Basic Overview • **Application Layer Services:** HTTP, FTP, Email, DNS. • **Transport Layer Primitives:** Connection Establishment and Closure. • **Transmission Control Protocol:** Basic Features, TCP Congestion Control. • **Network Layer Primitives:** IP Addressing. • **IP Services:** SNMP, ARP.	**30**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, 4th Ed.

Reference Books

- S. Tannenbum, D. Wetherall, "Computer Networks", Prentice Hall, Pearson, 5Th Ed.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Comprehensive Evaluation (CCE): **20 Marks**

Semester End Exam (SEE): **80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (02 each)	04 x 5 = 20 Marks
	Question - C: Short answer type question	05 x 5 = 25 Marks
	Question -D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 80 Marks**

Name & Signature of Members of Board of Studies

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

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

B.Sc. with Electronics
Session 2024-2025
Semester IV
SEC (Theory & Practical/Project)
BELSE201: ARDUINO SOFTWARE

Credits: 02
Theory – 01
Practical – 01

Lectures: 45 Hours
Theory – 15 Hours
Practical – 30 Hours

Course Outcomes (CO):

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

CO1	**Design circuits using Arduino software and simulate it.**

THEORY – BELSE201: ARDUINO SOFTWARE

- 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.

PRACTICAL/PROJECT – BELSEL201: ARDUINO SOFTWARE LAB

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

REFERENCE BOOKS:

- ARDUINO PROJECT HANDBOOK, Mark Geddes, San Francisco

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker** .....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra** .....
	6. Dr. Kusumanjali Deshmukh.....

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

Syllabus and Marking Scheme for B.Sc. with Physics

Session 2024-2025

Semester V

Course Type	Title of the Paper	No. of Credits	Marks Allotted in Theory & Practical			
			SEM. END	INTERNAL ASS.	TOTAL MARKS	
			Max	Max	Max	Min
DSC	**BEL501 :** Industrial Electronics, Information Theory and Coding	3	60	15	75	30
DSC	**BELL501 :** Industrial Electronics, Information Theory and Coding Lab	1	25	-	25	10
DSE	**BEL502 :** Operational Amplifier	3	60	15	75	30
DSE	**BELL502 :** Operational Amplifier Lab	1	25	-	25	10
SEC	**BELSE101 :** Cyber Security	1	25	-	25	10
SEC	**BELSEL101 :** Cyber Security Lab/Project	1	25	-	25	10

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - V**	**Session: 2024-2025**
1	**Course Code**	**BEL501**		
2	**Course Title**	**INDUSTRIAL ELECTRONICS, INFORMATION THEORY AND CODING**		
3	**Course Type**	**Discipline Specific Course (DSC)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understand various types of voltage regulators. • Understand the basic knowledge of Thyristor family. • Understand the controlled rectification. • Understand mechanism of Inverters and Choppers. • Understand the concept of various source coding and error control coding techniques.		
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :75**		**Minimum Passing Marks:30**

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Regulated Power Supply:** Block diagram of regulated power supply, voltage regulator characteristics, Types of voltage regulators, Zener diode voltage regulator, Transistorized series voltage regulator, Transistorized shunt voltage regulator, Op-amp voltage regulator, Switch Mode Power Supply (SMPS), Comparison of Linear Power Supply and SMPS, Uninterruptible Power Supply (UPS).	**9**
II	**Thyristors:** Introduction to thyristor family, Construction, equivalent circuit, working principle, symbol, characteristics and applications of SCR, UJT, DIAC, TRIAC, PUT, LASCR, IGBT, GTO.	**12**

III	**Turn-on and Turn-off Methods of Thyristors:** Triggering methods of SCR, different methods of turning on of SCR, Commutation Techniques: Types of commutation, Natural commutation, Forced commutation, Series resonance/current commutation, Voltage commutations, Auxiliary thyristor for commutation, External pulse commutation. di/dt rating, dv/dt rating, Protection against dv/dt, over voltage & over current protection, necessity of series and parallel combination.	**8**
IV	**Phase Controlled Rectifiers:** Half wave & full wave rectifiers, phase controlled Rectifier with R, RL & RL with free-wheeling diode load, 3 phase half wave & full wave rectifier with Resistive load. **Inverters:** Working principle of inverter, Single phase half bridge inverter and Single phase full bridge inverter. **Chopper:** Principle of operation, Step down chopper and Step up chopper. Types of chopper circuit (A-type to D-type).	**9**
V	**Information Theory**: Introduction, Unit of Information, Entropy, Rate of Information, Joint Entropy and Conditional Entropy, Mutual Information, Channel Capacity. **Coding:** Introduction, Coding Efficiency, Shannon-Fano Coding, Huffman Coding, Error-Control, Hamming codes.	**7**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- Power Electronics - Muhammad H. Rashid, Prentice Hall of India, Second Edition, New Delhi.
- Information theory: F.M Reza, McGraw Hill.

Reference Books :

- Power Electronics - A.K. Gupta & L.N. Singh, Dhanpat Rai Publishing Company, 1st Edition.
- Power Electronics - J. Asger, PHI Publication.
- Communication System - R. P. Singh & S.D. Sapre TMH.
- Power Electronics: R.M. Jalnekar & N.B. Pasalkar.
- Pspice Simulation of Power Electronic Circuits: Raymond Ramshaw.
- Spice for Power Electronics and Electric Power: Muhammad H. Rashid, Prentice Hall of India.
- Communication Systems, Simon Haykin, John Wiley & sons, NY, 4th Edition.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **75 Marks**

Continuous Comprehensive Evaluation (CCE): **15 Marks**

Semester End Exam (SEE): **60 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (01 each)	02 x 5 = 10 Marks
	Question - C: Short answer type question	03 x 5 = 15 Marks
	Question - D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 60 Marks**

Name & Signature of Members of Board of Studies

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

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

LAB COURSE

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - V**	**Session: 2024-2025**
1	**Course Code**	**BELL501**		
2	**Course Title**	**INDUSTRIAL ELECTRONICS, INFORMATION THEORY AND CODING LAB**		
3	**Course Type**	**Discipline Specific Course (DSC)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Demonstrate the applications of various power electronics devices. • Analyze the parameters of waveforms generated by various power electronics devices.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**

PART B: CONTENT OF THE COURSE

S. No.	**List of Experiments**
1	Study of regulated power supply using zener diode and transistor.
2	Study of VI characteristic of a silicon controlled Rectifier (SCR).
3	Study of VI characteristic of a DIAC.
4	Study of VI characteristic of a TRIAC.
5	Study of VI characteristic of a UJT.
6	Application of UJT as relaxation Oscillator.
7	To obtain the output and transfer characteristics of MOSFET and to plot the same
8	To obtain the steady state output and transfer characteristics of IGBT and to plot the same
9	To study the operation of single phase half controlled bridge converter with R and RL load and to determine rectification ratio, form factor and ripple factor.
10	To study the operation of single phase fully controlled bridge converter with R and RL load and to determine rectification ratio, form factor and ripple factor.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

- Fundamentals of Power Electronics ISTE S. K. Bhattacharrya.
- Fundamentals of Power Electronics by S. Rama Raddy.
- Industrial and Power Electronics by Harish C. Rai.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **25 Marks**

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)	**Laboratory performance:** Students are required to perform one experiment, take observation and make calculations in the allotted duration of 2 hours. Viva voce will be based on the experiment performed.

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker ……
Specialist from Industry……	5. Dr. Abhishek Kumar Misra ……
	6. Dr. Kusumanjali Deshmukh……

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - V**	**Session: 2024-2025**
1	**Course Code**	**BEL502**		
2	**Course Title**	**OPERATIONAL AMPLIFIER**		
3	**Course Type**	**Discipline Specific Elective (DSE)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Know and discuss differential amplifier circuits. • Understand basics of Operational Amplifier and its applications. • Understand electronics wave-shaping circuits. • Understand timer IC and its applications. • Understand designing concepts of active filters.		
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :75**	**Minimum Passing Marks:30**	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Differential Amplifier:** Basics of differential amplifier, BJT differential amplifier analysis using T-model (re-model), BJT differential amplifier analysis using hybrid model, Configurations of differential amplifier, Differential amplifier with swamping resistors, Constant current bias, current mirror, cascode or CE-CB configuration.	**7**

II	**Operational Amplifier:** : Op-Amp Symbol and terminal characteristics, Block schematic of Op-Amp, Ideal Op-Amp characteristics, Transfer characteristic of Op-Amp, Practical Op-Amp characteristics, Open loop configuration of Op-Amp, Closed loop configuration of Op-Amp: Voltage series feedback amplifier, Voltage shunt feedback amplifier, Concept of virtual ground. **Op-Amp Parameters:** Input offset voltage, Input offset current, Input bias current, Differential input resistance, Common mode rejection ratio, Slew rate, Supply voltage rejection ratio.	**7**
III	**Linear Applications of Op-Amp**: Ideal inverting amplifier, Ideal non-inverting amplifier, Voltage Follower, Adder or Summing Amplifier, Subtractor or Difference Amplifier, Integrator, Differentiator, Instrumentation Amplifier, Voltage to Current Converter, Current to Voltage Converter.	**9**
IV	**Comparators and Converters**: Comparator, Zero Crossing Detector, Schmitt Trigger, Window Detector, Peak Detector, Sample and Hold Circuit, Clipper, Clamper, Frequency to Voltage and voltage to frequency Converters.	**9**
V	**Signal Generator**: Square Wave Generator, Triangular Wave Generator, Saw-tooth Wave Generator. **IC-555 Timer**: Functional Block Diagram of IC-555, Features of IC-555, Monostable Multivibrator using IC-555, Astable Multivibrator using IC-555. **Active Filters**: First and Second Order Low Pass and High Pass Butterworth Filters, All Pass Filter.	**13**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- OP-AMP and linear Integrated Circuits- Ramakant Gayakwad, PHI, New Delhi.
- Linear Integrated Circuit and Application by Godse and Baksi (Technical Publication).

Reference Books :

- Pulse, Digital and Switching Waveforms by Millman & Taub, TMH Publishing Co.
- Integrated Circuits: K. R. Botkar,9th Ed., Khanna Publications.
- Operational Amplifiers and Linear Integrated Circuits, Coughlin and Driscoll, 6th Ed., PHI.
- Linear Integrated Circuits, Roy Choudhury and Jain, 2nd Ed., New Age International Publishers.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks:** **75 Marks** **Continuous Comprehensive Evaluation (CCE):** **15 Marks** **Semester End Exam (SEE):** **60 Marks**	
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (01 each) 02 x 5 = 10 Marks Question - C: Short answer type question 03 x 5 = 15 Marks Question - D: Long answer type question 07 x 5 = 35 Marks **Total = 60 Marks**

Name & Signature of Members of Board of Studies

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

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG
FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

LAB COURSE

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - V**	**Session: 2024-2025**
1	**Course Code**	**BELL502**		
2	**Course Title**	**OPERATIONAL AMPLIFIER LAB**		
3	**Course Type**	**Discipline Specific Elective (DSE)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Demonstrate the linear applications of op-amp and calculate the gain of amplifiers. • Demonstrate the linear applications of IC 555 timer and calculate the gain of amplifiers. • Analyze the frequency response of different amplifiers. • Analyze the frequency response of various types of filters.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**

PART B: CONTENT OF THE COURSE	
S. No.	**List of Experiments**
1	To design inverting amplifier using OP-AMP 741 IC for DC voltage and calculate the voltage gain.
2	To design non-inverting amplifier using OP-AMP 741 IC for DC voltage and calculate the voltage gain.
3	To design summing amplifier using OP-AMP 741 IC for DC voltage and calculate the voltage gain.
4	To design difference amplifier using OP-AMP 741 IC for DC voltage and calculate the voltage gain.
5	To design and setup a Differentiator circuit using OP-AMP 741 IC and plot their pulse response.
6	To design and setup an integrator circuit using OP-AMP 741 IC and plot its pulse response.
7	To design an astable multivirator using 555 timer.
8	To design a monostable multivibrator using 555 timer
9	To design High Pass Filter using OP-AMP 741 IC
10	To design Low Pass Filter using OP-AMP 741 IC.

PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
TEXT BOOKS Recommended : • Integrated Circuits: K. R. Botkar, Khanna Publshers. • Linear Interated Circuit and Application by Godse and Baksi (Technical Publication). **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)**

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks:** **25 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance:** Students are required to perform one experiment, take observation and make calculations in the allotted duration of 2 hours. Viva voce will be based on the experiment performed.

Name & Signature of Members of Board of Studies

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

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

B.Sc. with Electronics

Session 2024-2025

Semester V

SEC (Theory & Practical/Project)

BELSE101: CYBER SECURITY

Credits: 02

Theory – 01

Practical – 01

Lectures: 45 Hours

Theory – 15 Hours

Practical – 30 Hours

Course Outcomes (CO):

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

CO1	**Understand the issues of cyber security.**
CO2	**Learn the techniques of for encryption and Steganography.**
CO3	**Familiarize with cyber security law.**

THEORY – BELSE101: CYBER SECURITY

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.

PRACTICAL/PROJECT – BELSEL101: CYBER SECURITY

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

REFERENCES BOOKS:

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

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker .....
Specialist from Industry.....	5. Dr. Abhishek Kumar Misra .....
	6. Dr. Kusumanjali Deshmukh.....

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

Syllabus and Marking Scheme for B.Sc. with Electronics

Session 2024-2025

Semester VI

Course Type	Title of the Paper	No. of Credits	Marks Allotted in Theory & Practical			
			SEM. END	INTERNAL ASS.	TOTAL MARKS	
			Max	Max	Max	Min
DSC	**BEL601 :** Advance Microprocessor and Microcontroller	3	60	15	75	30
DSC	**BELL601 :** Advance Microprocessor and Microcontroller Lab	1	25	-	25	10
DSE	**BEL602 :** Signals and Systems	3	60	15	75	30
DSE	**BELL602 :** Signals and Systems Lab/Tutorial	1	25	-	25	10
SEC	**BELSE201 :** Arduino Software	1	25	-	25	10
SEC	**BELSEL201 :** Arduino Software Lab/Project	1	25	-	25	10

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - VI**	**Session: 2024-2025**
1	**Course Code**	**BEL601**		
2	**Course Title**	**ADVANCE MICROPROCESSOR AND MICROCONTROLLER**		
3	**Course Type**	**Discipline Specific Course (DSC)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Gain knowledge about architecture of advance microprocessors. • Demonstrate the ability to program the 8086 microprocessor. • Describe the architecture and functional block of 8051 microcontroller. • Develop an embedded C and assembly language program in 8051 microcontroller using the internal functional blocks for the given specification.		
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :75**		**Minimum Passing Marks:30**

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Architecture of 8086**: Differences Between 8085 and 8086, Overview of 8086 Microprocessor Family, Architecture and Pin Configuration of 8086, System Bus Structure: Basic 8086/8088 system bus architecture, Minimum Mode Configuration, Maximum Mode configuration; System Bus Timings, Bus Standards.	**9**
II	**Instruction Set and Assembly Language Programming of 8086:** Instruction Format; Addressing modes, Data Transfer Instruction, Arithmetic Instructions, Branching and Looping Instructions, NOP and Halt, Flag Manipulation Instructions, Logical, Shift and Rotate Instruction. Byte and String Manipulation: String Instructions; REP Prefix, Programming of Microprocessor 8086.	**11**

III	**8051 Microcontroller**: Introduction of 8051 microcontroller, Comparison between Microprocessor & Micro controller, Overview of 8051 Family, Architecture of 8051 microcontroller, Registers, Program Counter and ROM Memory Map, Data Types and Directives, Flag Bits and Program Status Word(PSW) Register, JUMP, LOOP and CALL Instructions.	**7**
IV	**8051 I/O Port Programming:** I/O Port Pins Descriptions and their Functions, I/O Port Programming in 8051 (Using Assembly Language), I/O Bit Manipulation Programming, Pin Out Diagram of 8051 Microcontroller. **8051 Programming:** 8051 Addressing Modes and Accessing Memory Locations using various addressing Modes, Bit addressable RAM, Arithmetic and Logic Instructions.	**9**
V	**8051 Programming in C:** Data types and time delay in 8051 C, I/O programming in 8051 C, Logic Operations in 8051 C, Data conversion programs in 8051 C (ASCII and BCD Conversions). **Introduction to embedded system:** Embedded System versus General purpose Computer Systems, Architecture of Embedded System, Characteristics, Classifications, Applications and Purpose of Embedded System.	**9**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- Advance Microprocessors & peripherals, A.K. Ray & K.M. Bhurchundi (TMH).
- 8051 micro controller & embedded systems, M.A. Mazidi & J.G. Mazidi.
- Introduction to embedded system, k. V. Shibu, I edition, 2009, McGraw Hill.

Reference Books :

- Programming & Interfacing of 8086/8088, Douglas V. Hall (TMH).
- The Intel 8086/8088, 80286, 80386, 80486, Pentium & Pentium, Pro processor Architecture & Interfacing, Barry B. Brey.
- Microcomputer systems 8086/8088 family, programming and interfacing, Y. Liu & G.A. Gibson (PHI).
- Introduction to programmable logic controller, Dunning, Gary, Delmar, Thomson.
- The 8051 micro controller architecture programming & applications, Kenneth J. Ayala.
- Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill.
- Embedded Systems: Design & applications, S.E Barrett, 2008, Pearson Education India.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **75 Marks**

Continuous Comprehensive Evaluation (CCE): **15 Marks**

Semester End Exam (SEE): **60 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (01 each)	02 x 5 = 10 Marks
	Question - C: Short answer type question	03 x 5 = 15 Marks
	Question - D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 60 Marks**

Name & Signature of Members of Board of Studies

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

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

LAB COURSE

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - VI**	**Session: 2024-2025**
1	**Course Code**	**BELL601**		
2	**Course Title**	**ADVANCE MICROPROCESSOR AND MICROCONTROLLER LAB**		
3	**Course Type**	**Discipline Specific Course (DSC)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Set up programming strategies and select proper mnemonics and run their program on the training kits. • Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison. • Primarily via team-based laboratory activities, students will demonstrate the ability to interact effectively on a social and interpersonal level with fellow students.		
5	**Credit Value**	**1 Credit**	**1 credit =30 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**

PART B: CONTENT OF THE COURSE	
S. No.	**List of Experiments**
	<u>8086 Microprocessor</u>
1	Write a program to add two 16 bit numbers.
2	Write a program to subtract two 16 bit numbers.
3	Write a program to multiply two 8 bit numbers.
4	Write a program to divide 16 bit number by 8 bit number.
5	Write a program to add ten data bytes.
6	Write a program to move a block of data from one memory location to the other.
7	Write a program to arrange data in ascending order.
8	Write a program to arrange data in descending order
9	Write a program to find largest number in an array.

	8051 Microcontroller (Keil Software)
1	Addition of Two 8-Bit Numbers.
2	Addition of Two 16-Bt Numbers.
3	Subtraction of Two 8-Bit Numbers.
4	Subtraction of Two 16-Bit Numbers.
5	Multiplication of Two 8-Bit Numbers.
6	Program for Swapping and Compliment of 8-Bit Numbers.
7	Program to Find the Largest Number In Given Array.
8	Program to Find the Smallest Number In Given Array.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- Advance Microprocessors & peripherals, A.K. Ray & K.M. Bhurchundi (TMH).
- 8051 micro controller & embedded systems, M.A. Mazidi & J.G. Mazidi.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **25 Marks**

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)	**Laboratory performance:** Students are required to perform one experiment, take observation and make calculations in the allotted duration of 2 hours. Viva voce will be based on the experiment performed.

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker** .....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra** .....
	6. Dr. Kusumanjali Deshmukh.....

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

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF PHYSICS

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: FYUP B.Sc. with Electronics		**Class: B.Sc. (Maths)**	**Semester - VI**	**Session: 2024-2025**
1	**Course Code**	**BEL602**		
2	**Course Title**	**SIGNALS AND SYSTEMS**		
3	**Course Type**	**Discipline Specific Elective (DSE)**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Understand the classification of signals and systems. • Gain knowledge about the frequency domain analysis of continuous time and discrete time signals. • Analyze state equation for continuous and discrete type systems. • Apply the fourier, Laplace and Z-transform for solving continuous time and discrete time signals.		
5	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :75**		**Minimum Passing Marks:30**

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**CLASSIFICATION OF SIGNALS & SYSTEMS:** Classification of Signals: Continuous Time signals: Definition and expressions of Unit step, Ramp, Unit Impulse, Complex Exponential, General complex exponential, Real exponential, Sinusoidal signal. Discrete time signal: Unit sample sequence, Unit step sequence, Unit ramp sequence, Exponential sequence. Representation of discrete time signals: Deterministic and Random Signals, Periodic & Non-periodic Signal, Even & Odd Signals, Energy & Power Signals. Discrete Time systems: Adder, Constant multiplier, Signal multiplier, Unit delay block, Unit advance block. Classification of discrete time systems: Static & Dynamic, Causal & Non-causal, Time invariant & Time variant, Linear & Non-linear, Stable & Unstable systems	**7**

II	**ANALYSIS OF CONTINUOUS TIME SIGNALS:** Fourier series representation of Periodic signals, Representation of Fourier series in Exponential form, Frequency spectrum, Properties of Continuous time Fourier series, Perseval's theorem, Fourier Transform, Properties of Fourier Transform, Fourier transform of some common time function Convolution property, Laplace Transform, Properties of Laplace Transform, Region of Convergence. Laplace transform of some common time function.	**12**
III	**LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEM:** Transfer function and Impulse response, Block diagram representation and Reduction technique, Convolution integral, State variable techniques, State equations for Electrical networks, State equations from transfer functions.	**7**
IV	**ANALYSIS OF DISCRETE TIME SIGNALS:** Discrete Time Fourier Transform, Properties of DTFT, Discrete Fourier transform, Properties of DFT, Circular convolution, Z-Transform, Region of Convergence, Relation between Z-transform and DTFT, Properties of Z-transform, Inverse Z-Transform.	**12**
V	**ANALYSIS OF DISCRETE TIME LTI SYSTEM:** Transfer function & Impulse response, Eigen function & Eigen value, Causality, Stability, LTI system characterized by Linear constant, Convolution sum, Convolution by graphical method, Block diagram representation for LTI systems described by difference equation, Unit impulse response, Introduction to Fast Fourier Transform.	**7**
Tutorial Topics	• **Types of Signal and Transformations.** • **Fourier Transform of Continuous Time Signals.** • **Convolution and LTI System Properties.** • **Laplace Transform.** • **Fourier Series of Continuous-Time Periodic Signals and Properties.** • **Discrete-Time LTI Systems and Sampling.** • **Discrete-Time Fourier Transform (DTFT).** • **Z-Transform.**	**30**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended :

- Signals & Systems: Alan Oppenheim & Alan Wilsky, S Nawab, PHI.
- Signals & Systems: Smarjit Ghosh, Pearson Education.
- Simon Haykin, Signals and Systems, 2nd Edition, Wiley India.

Reference Books :

- Signals & Systems: A. Anand Kumar, 2nd Edition, PHI.
- Signals & Systems: H. P. Hsu, McGraw-Hill Publication.
- Signals & Systems: Nagrath, Sharan, Ranjan & Kumar, TMH.
- Signals & Systems: Farooq Husain, Umesh Publications.
- Signals, Systems and Communications: B.P. Lathi, BS Publications.
- Signals & Systems: Babu & Natarajan, Scitech Publications.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 75 Marks** **Continuous Comprehensive Evaluation (CCE): 15 Marks** **Semester End Exam (SEE): 60 Marks**	
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (01 each) 02 x 5 = 10 Marks Question - C: Short answer type question 03 x 5 = 15 Marks Question - D: Long answer type question 07 x 5 = 35 Marks **Total = 60 Marks**

Name & Signature of Members of Board of Studies

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

Govt. V.Y.T. PG Autonomous College, Durg (Chhattisgarh)

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

B.Sc. with Electronics
Session 2024-2025
Semester VI
SEC (Theory & Practical/Project)
BELSE201: ARDUINO SOFTWARE

Credits: 02
Theory – 01
Practical – 01

Lectures: 45 Hours
Theory – 15 Hours
Practical – 30 Hours

Course Outcomes (CO):

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

CO1	**Design circuits using Arduino software and simulate it.**

THEORY – BELSE201: ARDUINO SOFTWARE

- 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.

PRACTICAL/PROJECT – BELSEL201: ARDUINO SOFTWARE LAB

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

REFERENCE BOOKS:

- ARDUINO PROJECT HANDBOOK, Mark Geddes, San Francisco

Name & Signature of Members of Board of Studies

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. Dr. Siteshwari Chandraker** .....
Specialist from Industry.....	**5. Dr. Abhishek Kumar Misra** .....
	6. Dr. Kusumanjali Deshmukh.....