KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ

ಸ್ವಾತಂತ್ರ್ಯದ ಅಮೃತ ಮಹೋತ್ಸವ

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NAAC Accredited
'A' Grade 2014

website: kud.ac.in

No. KU/Aca(S&T)/SSL-394A/2022-23/1056 Date: 23 SEP 2022

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2022–23ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸಗಳಿಗೆ 3 ಮತ್ತು 4ನೇ ಸೆಮೆಸ್ಟರ್ NEP-2020 ಮಾದರಿಯ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

ಉಲ್ಲೇಖ: 1. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿಗಳು(ವಿಶ್ವವಿದ್ಯಾಲಯ 1) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರ ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 260 ಯುಎನ್ಇ 2019(ಭಾಗ–1), ದಿ:7.8.2021.
2. ವಿಜ್ಞಾನ & ತಂತ್ರಜ್ಞಾನ ನಿಖಾಯ ಸಭೆಯ ಠರಾವುಗಳ ದಿನಾಂಕ: 06.09.2022
3. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂ. 01, ದಿನಾಂಕ: 17.09.2022
4. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: 22-09-2022

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2022–23ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, **ವಿಜ್ಞಾನ & ತಂತ್ರಜ್ಞಾನ** ನಿಖಾಯದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸಗಳ ರಾಷ್ಟ್ರೀಯ ಶಿಕ್ಷಣ ನೀತಿ (NEP)-2020 ರಂತೆ 3 ಮತ್ತು 4ನೇ ಸೆಮೆಸ್ಟರ್‌ಗಳಿಗಾಗಿ ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಪ್ರಕಟಪಡಿಸಿದ್ದು, ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. www.kud.ac.in ಅಂತರ್ಜಾಲದಿಂದ ಡೌನಲೋಡ ಮಾಡಿಕೊಳ್ಳಲು ಸೂಚಿಸುತ್ತಾ, ವಿದ್ಯಾರ್ಥಿಗಳು ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ ತಂದು ಅದರಂತೆ ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕವಿವಿ ಅಧೀನದ / ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ ಸೂಚಿಸಲಾಗಿದೆ.

ಕುಲಸಚಿವರು.

ಅಡಕ: ಮೇಲಿನಂತೆ

ಗೆ,
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ. (ಕ.ವಿ.ವಿ. ಅಂರ್ತಜಾಲ ಹಾಗೂ ಮಿಂಚಂಚೆ ಮೂಲಕ ಬಿತ್ತರಿಸಲಾಗುವುದು)

ಪ್ರತಿ:

1. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಕುಲಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ಅಧೀಕ್ಷಕರು, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ / ಗೌಪ್ಯ / ಜಿ.ಎ.ಡಿ. / ವಿದ್ಯಾಂಡಳ (ಪಿ.ಜಿ.ಪಿಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ ಕೋರ್ಸುಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

Practical Subject

KARNATAK UNIVERSITY, DHARWAD

Four - Year B. Sc. (Hons.) Program

SYLLABUS FOR SEM III & IV

Course: ELECTRONICS

SEMESTER - III:

DISCIPLINE SPECIFIC CORE COURSE(DSCC)

DSCC – 5 : Electronics (Theory) - I (Code:033ELE011)

DSCC – 6 : Electronics (Practical) - II (Code:033ELE012)

OEC- 3 : Basics of Communication Methods (Code: 003ELE051)

SEMESTER - IV:

DSCC – 7 : Electronics (Theory) - III (Code:034ELE011)

DSCC - 8 : Electronics (Practical) - IV (Code:034ELE012)

OEC- 4 : Basic Instrumentation (Code:004ELE051)

Effective from 2022-23

AS PER N E P - 2020

Karnatak University, Dharwad

Sem	Type of Course	Course Code	Instruction hour per week (hrs)	Total hours of Syllabus / Sem	Duration of Exam (hrs)	Formative Assessment Marks	Summative Assessment Marks	Total Marks	Credits
III	DSCC -5 Electronics (Theory) - V	033ELE011	04	56	02	40	60	100	04
	DSCC -6 Electronics (Practical) - VI	033ELE012	04	52	03	25	25	50	02
	OEC- 3 Basics of Communication Methods	003ELE051	03	42	02	40	60	100	03
IV	DSCC -7 Electronics (Theory) - VII	034ELE011	04	56	02	40	60	100	04
	DSCC -8 Electronics (Practical) - VIII	034ELE012	04	52	03	25	25	50	02
	OEC- 4 Basic Instrumentation	004ELE051	03	42	02	40	60	100	03
Details of the other Semesters will be given later									

Name of Course (Subject): ELECTRONICS

Programme Specific Outcome (PSO):

On completion of the 03 / 04 years B.Sc. Degree in ELECTRONICS, the students will be able to:

PSO1: Provide learning experiences that provide broad knowledge and understanding of key concepts of Electronics and equip students with advanced scientific / technological capabilities for analysing and tackling then issues and problems in the field of Electronics.

PSO2. Develop ability in students to apply knowledge and skills they have acquired to solve specific theoretical and applied problems in Electronics

PSO3: Develop abilities in students to design and develop innovative solutions for the benefit of society.

PSO4: Provide students with skills that enable them to get employment in industries or pursue higher studies or research assignments or turn as enterpreneurs.

B.Sc. Semester – III

DSCC-5: Electronics (Theory) V (Code: 033ELE011)

Title of the Course (Theory): Digital Design using Verilog and Programming in C

Syllabus-	Total Hrs: 56
Unit-I: Introduction to Verilog:	**14 hrs**
A Brief History of HDL, Structure of HDL Module, Comparison of VHDL and Verilog, Introduction to Simulation and Synthesis Tools, Test Benches. Verilog: Module, Delays, brief description - data flow style, behavioral style, structural style, mixed design style, simulating design. Language Elements- Introduction, Keywords, Identifiers, White Space Characters, Comments, format, Integers, reals and strings. Logic Values, Data Types-net types, undeclared nets, scalars and vector nets, Expressions: Operands, Operators, types of Expressions Gate level modeling - Introduction, built in Primitive Gates, multiple input gates, Tri-state gates, Illustrative Examples (both combinational and sequential logic circuits).	
Unit-II: Data flow Modeling and Behavioral Modeling:	**14 hrs**
Data flow Modeling: Continuous assignment, net declaration assignments, delays, net delays and examples. Behavioral Modeling: Procedural constructs, timing controls, block statement, procedural assignments, conditional statement, The 'Case' Statement, 'If' and 'if-Else' Constructs, loop statement, 'Repeat' Construct, for loop, 'The Disable' Construct, 'While Loop', Forever Loop, procedural continuous assignment, Illustrative Examples	
Unit-III: Basics of "C"- Programming:	**14 hrs**
Brief explanation of basic block diagram of computer, Computer programming preliminaries, Algorithm, Flowcharts and their symbols, some simple examples. Introduction to C-programming**,** Importance of C, Character set, Basic Structure of C program, Execution of C, C tokens, key words, identifiers, Constants, Variables and data types,data type modifiers. Declaration of variables, assigning values to variables, defining symbolic constants,Formatted and unformatted Input and output statements,Operators and expressions (All type), Precedence of operators. Solve sufficient problems.	

Unit-IV: Decision Making & Branching, Arrays and Functions:	**14 hrs**
Conditional & control statements- if statement, if-else statement, Nested if statement, Switch statement and goto- statement. Loop control structures- while, do-while and for statements. **Arrays:** One- and two-dimensional arrays, Declaration and initialization of arrays, multidimensional arrays. **Strings:** and initializing of string variables, reading and writing of strings, String handling functions. **Functions:** Function definition, arguments and parameters, local and global variable, Function declaration, simple C-programs using functions. Solve sufficient problems.	

Course Outcomes

At the end of this course, the students will be able to

1) Understand Verilog as hardware description language which is used to model electronic systems.
2) Understand basics of system Verilog and development of digital design using Verilog.
3) Understand the basics of simulation and synthesis tools.
4) Understand basics of HDL, its syntax, data flow modeling and practical examples.
5) Build a strong foundation in programming and logical thinking.
6) Develop C-Programs.
7) Control the sequence of the program using control statements and looping.
8) Implement arrays and strings in the program.

Books Recommended.

1. Digital Fundamentals: Thomas Floyd, Pearson publication Eleventh *Edition.*
2. Modern Digital Electronics: R.P. Jain, 3rd Edition, TMH Publications.
3. A Verilog HDL Primer – J. Bhasker, BSP, 2003 II Edition.
4. Verilog HDL-A Guide to Digital Design and Synthesis-Samir Palnitkar, Pearson, 2nd Edition.
5. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, 2004 IEEE
6. Fundamentals of Computers - V Rajaram, Neeharika Adabala - PHI.
7. Computer Fundamentals - Peter Norton, McGraw-Hill Education.
8. Computer concepts and C-Programmimng, P.B. Kotur.
9. Let Us C, Yashavant Kanetkar, BPB Publications
10. Programming in ANSI C, Balagurusamy, 2nd edition, TMH.
11. Byron S Gottfried, Programming with C, Schaum Series

B.Sc. Semester – III

DSCC-6: Electronics (Practical) - VI (Code: 033ELE012)

Title of the Course (Practical): Digital Design using Verilog and Programming in C

List of the Experiments for 52 hrs / Semester

1. Realization of basic gates (OR, AND and NOT) using verilog code.
2. Simplify the given boolean expressions and realize using verilog programme.
3. Realize Adder/subtractor (Full/Half) circuits using verilog data flow description.
4. Realize the following code converters using verilog behavioral description.
   a) Gray to Birary and Vice – Versa.
   b) Binary to excess 3 and vice-versa.
5. To realize counters: Up/down (BCD & Binary) using verilog behavioral description.
6. To realize using verilog behavioral description flip flops:
   a) JK - type (b) SR type (c) T-type (d) D-type.
7. To realize 4-bit ALU using verilog programme
8. C-Program to find i) area of a triangle ii) area of triangle when sides are given iii) area of a circle.
9. C-program using if-else statement i) to check whether given number is odd or even ii) to find whether a given integer is positive or negative.
10. C-program to find largest and smallest of given numbers.
11. C-program to find the roots of a quadratic equation.
12. C-program to illustrate switch statement.
13. C-program to find factorial of a number using while, do and for loops.
14. C-program to generate the Fibonacci series.
15. C-program to find sum of odd and even numbers using functions.
16. Write code to realize basic and sum & difference of two matrices using arrays.
17. C-program to find reverse of a number and to check whether it is a palindrome or not.

General instructions:

1. ***Minimum of eight experiments to be performed.***
2. ***Any new experiment may be added to the list with the prior approval from the BOS.***

Scheme of Practical Examination (Distribution of Marks): 25 Marks for Semester end Examination

1. Algorithm/Basic formula with description.	**- 03**	**Marks**
2. Flow Chart/Tabular Column with quantities	**- 03**	**Marks**
3. Writing Programme/Calculations of Required quantities	**- 05**	**Marks**
4. Debugging and Execution of Programme	**- 10**	**Marks**
5. Viva-Voce.	**- 02**	**Marks**
6. Completed & Certified Journal.	**- 02**	**Marks**
	Total 25	**Marks**

Note: Same Scheme may be used for IA (Formative Assessment) examination

Course Outcomes

After completing this course, the students will be able to

1) Develop C Programs and execute them.
2) Control the sequence of the program and give logical outputs.
3) Implement strings in C program and will have ability to work with arrays.
4) Store different data types in the same memory.
5) Manage I/O operations in C program.
6) Able to write c programs using loop structures.
7) Understand the basics of Hardware Description Languages, Program structure and basic language elements of Verilog.
8) Understand types of modelling, modules, functions of Verilog and simulate and synthesize related Programs.
9) Design, Simulate and Synthesize various Verilog descriptions for Combinational circuits.
10) Design, Simulate and Synthesize various Verilog descriptions for Sequential circuits.

B.Sc. Semester – III

OEC – 3: Electronics (003ELE051)

Title of the Course: Basics of Communication Methods

Syllabus	Total Hrs: 42
Unit-I: Radio Communication	**14 hrs**
Antenna: Function of antenna, Types of antenna, working of Yagi- Uda antenna and dish antenna (qualitative only) Classification of EM waves, Propagation of Radio waves: Ground wave propagation, Space wave propagation and Ionosphere: classification of ionosphere in to layers, Sky wave propagation, virtual height, critical frequency, critical angle. Modulation: definition of modulation, Types of modulation, AM FM. Modulation index in AM, FM. Representation of complete communication system using Simple block diagram (both transmitter & Receiver), Explanation of function of each block. Demodulation: AM detection (Diode as detector), Simple FM detector (balanced detector) Concepts of amplifiers used in communication system: audio frequency amplifier, Radio frequency amplifier.	
Unit-II: Optical Fiber Communication:	**14 hrs**
Fiber Optic Cable (FOC): Optical fiber definition and general construction, Principle of working, Types of FOC: step index, graded index. Cable mode: Single mode and Multi-mode fiber (Construction and profile) comparison of single and multi-mode fiber. Simple Block Diagram of Optical Fiber Communication system: Functions of each block, Sources of Light in OFC: LED: principle & working (qualitative) and Laser diode: Principle & working (qualitative)Comparison of Optical Fiber Communication System with cable communication and Radio communication systems Applications of OFC in other fields	
Unit-III: Satellite Communication:	**14 hrs**
Satellite Orbits & Positioning: Definition of satellite, satellite orbits: circular orbit & elliptical orbit, Satellite Height, apogee and perigee in case of elliptical orbits, satellite speed, satellite period, (Mention of Kepler's Laws of planetary motion) Angle of elevation, Geosynchronous orbits, position coordinates of satellite in terms of longitude and latitude (with clear illustration) Satellite communication System: general block diagram. Repeaters and transponders (qualitative), up linking and down linking. Frequency allocation. Satellite Applications: Discuss application of satellite in (1) communication (2) GPS (global positioning system) (3) weather forecasting (4) disaster management (5) agriculture Mention of various other applications of satellite to create awareness.	

Course Outcomes

After completing the course, the students will be able to

1) Understand the introduction of antennas, their principle of operation and their types.
2) Understand ionosphere, and different types of wave propagation.
3) Have knowledge about various modulation and demodulation techniques.
4) Understand block diagram of communication system.
5) Learn the communication satellite mechanics, block diagram of satellite communication system and applications of satellites.
6) Familiar with Optical Fiber Communication System, principle, types of OFC and applications.

Books Recommended

1. Principle of Electronic Communication Systems by Lois E Frenzel Jr.: Mc Graw Hill Education Pvt Ltd
2. Electronic Communication by Dennis Roddy & John Coolen: Pearson Education
3. Electronic Communication Systems by George Kennedy & Bernard Davis: Mc Graw Hill Education Pvt Ltd
4. Introduction To Fiber Optics by Ajoy Ghatak & K.Thyagarajan : Cambridge University Press
5. Satellite Communication by Dennis Roddy: Mc Graw Hill

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8th Week
Written test-2	10%	1 hr	12th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	------	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science

04 - Year UG Honors programme:2021-22

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC / OEC

(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

2. Question number 07- 11 carries 05marks each. Answer any 04 questions : 20 marks

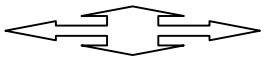
Part-C

3. Question number 12-15 carries 10 marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weightage shall be given to each unit based on number of hours prescribed.



B.Sc. Semester – IV

DSCC- 7: Electronics (Theory) - VII (Code: 034ELE011)

Title of the Course (Theory) : Electronic Communication - I

Syllabus	Total Hrs: 56
Unit-I: Wave Propagation and Communication System	**14 hrs**
Propagation of "EM" Wave: Introduction, Loss of "EM" Energy due to noise, Ground Wave, Sky-wave and Space-wave propagation. Ionosphere and its effects. **Antenna:** Introduction, Antenna parameters, Ferrite rod antenna, yagi-Uda antenna, Dish-antenna-principle, Working and applications only. **Analog Communication System:** Introduction, Block diagram, Noise-effects, Types: Transmitter, channel and receiver (Qualitative analysis only). **Modulation:** Need, Types, Applications and limitations.	
Unit-II: Analog Modulation and Detection	**14 hrs**
Analog Modulation: Amplitude Modulation: Graphical representation of "AM" Wave, expression for "AM" Wave, Frequency spectrum, modulation index, Band width, power relations, current relations, side bands. **Types of AM:** Double sideband, suppressed carrier modulation, single sideband modulation (SSB) and Vestigial Sideband modulation (VSB) – Description graphical representation and applications. **"AM" Modulators:** Types, Working of Collector Modulators. **"AM" Transmitter:** Block Diagram, Description, design aspect (Qualitative only) **"AM" Detector:** Diode AM Detector – Principle and Working, transistor AM detector. **Radio Receives:** Characteristics of receiver sensitivity, Selectivity, Signal to noise ratio, fidelity, Stability. Super heterodyne receiver- block diagram, Description.	
Unit-III: Frequency Modulation and Detection	**14 hrs**
Frequency Modulation: Definition, Representation of "FM", Expression for "FM" wave, modulation index, side bands, bandwidth requirements, frequency deviation, deviation ratio. **F.M Generation:** Varactor Diode and BJT reactance modulator. **F.M Transmitter:** Block diagram and description of blocks. **FM detector:** balanced slope detector, Foster Seeley discriminator, ratio detector.	
Unit-IV: Phase, Pulse and Digital Modulation	**14 hrs**
Phase Modulation: Definition, Description, Comparison with "FM". **Pulse Modulation:** Analog Pulse Modulation, Sampling Theorem PAM, PWM & PPM. **Digital Pulse Modulation:** Need, Pulse code modulation (PCM). **Digital Carrier Modulation:** Sampling, Quantization and Encoding, Concept of Amplitude Shift Key (ASK), Frequency Shift Key (FSK) and Phase Shift Key (PSK).	

Course Outcomes

At the end of this course, the students will be able to

1. Know the basic concept of Analog Communication.
2. Understand the principle with which Analog Communication works.
3. Know the Various modulation techniques involved in radio communication before the transmission.
4. Understand the various blocks involved in radio transmitter.
5. Know different detection process involved in receiver to detect the original signal and able to design "AM" and "FM" detectors.
6. Familiar with "AM" and "FM" super heterodyne receiver.
7. Understand the basic concept of Pulse Modulation, Carrier Modulation for digital transmission and able to construct simple pulse modulation.

Books Recommended:

1. G.K Mithal, "Radio Engineering Vol- II", Khanna Publishers, New Delhi.
2. K.D Prasad, "Antenna and Wave Propagation", Satyaprakashan, New Delhi.
3. Sanjeev Gupta, "Electronic Communication Systems", Khanna Publishers, New Delhi.
4. Roddy and Coolen, "Electronic Communication", PHI, IV Edition, 2012.
5. George Kennedy, "Electronics and Communication System", TMH, Edition, 2012.
6. Frenzel, "Principle of electronic communication system", III edition, Mc Graw Hill Publications.
7. S.Haykin, "Communication Systems", 2006, Wiley edition

B.Sc. Semester – IV

DSCC-8: Electronics (Practical) - VIII (Code: 034ELE012)

Title of the Course (Practical): : Electronic Communication - I

List of the Experiments for 52 hrs / Semesters

Minimum 8 Experiments are to be performed.

1. Construct amplitude modulator using transistor / I.C. Determination the modulation index.
2. Construct an A.F amplifier (R-C coupled amplifier). Determine the bandwidth and mid gain.
3. Construct Frequency Modulator Circuit – Determine the Modulation Index.
4. "AM" Linear Diode detector – Trace the input and output waveforms.
5. Construct "AGC" circuit for "AM" Detector and trace the response curve.
6. "FM" Detector – Ratio detector; plot the frequency response curve.
7. Study the "AM" transmitter.
8. Study "AM" receiver.
9. Pulse Amplitude Modulation (PAM) - trace the output waveforms.
10. Pulse Width Modulation (PWM) – trace the output waveforms.
11. Pulse Position Modulation (PPM) - trace the output waveforms.
12. Amplitude Shift Keying (ASK).
13. Frequency Shift Keying (FSK).
14. Phase Shift Keying (PSK).
15. Study the impedance characteristics of Microphone.
16. Study the Characteristics of loud speaker.

General instructions:

1. ***Minimum Four Experiments to be performed in each Part***
2. ***Any new experiment may be added to the list with the prior approval from the BOS.***

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

1. Basic formula, Units & Nature of graph, Circuit Diagram / Ray Diagram / Schematic diagram	**- 05 Marks**
2. Tabular Column with quantities and unit mentioned, experimental skills.	**- 05 Marks**
3. Recording of observations, calculations and drawing graph, and accuracy of the result	**- 11 Marks**
4. Viva-voce	**- 02 Marks**
5. Completed & Certified Journal	**- 02 Marks**
	Total 25 marks

Note: Same Scheme may be used for IA (Formative Assessment) examination

Course Outcomes

After competing this course, students will be able to:

1) Compute modulation index for various analog modulation schemes like AM and FM.
2) Evaluate the performance of analog and digital modulation - demodulation techniques.
3) Analyse various analog continuous wave modulation and demodulation techniques like AM and FM.
4) Construct and analyse AF amplifier, AM transmitter and receiver circuits.
5) Implement analog pulse modulation and demodulation methods like PPM and PWM.
6) Implement digital pulse modulation and demodulation methods like ASK, FSK and PSK.

B. Sc. Semester – IV

OEC-4: Basic Instrumentation (Code: 004ELE051)

Syllabus	Total Hrs: 42
Unit-I: Basics of Measurements and Instruments	**14 hrs**
Basics of Measurements: Instrumentation, accuracy, precision, sensitivity, resolution, errors in measurements, classification of instruments Basic d'Arsonvel meter movement, principle of voltmeter, construction of multirange voltmeter examples, voltmeter sensitivity, loading effect of voltmeter, principle of ammeter, construction of multirange milliammeter, examples. **Ohmmeter**- series type ohmmeter construction, problems, Shunt type Ohmmeter Construction, examples. **Multimeter:** Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications and their significance. **Electronic Voltmeter:** Block diagram, advantages over conventional multimeter for voltage measurement, **AC millivoltmeter:** Types of AC millivoltmeters: Amplifier-rectifier, rectifier-amplifier. Block diagram of ac millivoltmeter, specifications and their significance.	
Unit-II: Cathode Ray Oscilloscope	**14 hrs**
Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT. Electron gun, electrostatic focusing and acceleration (Explanation only-no mathematical treatment), brief discussion on screen phosphor, visual persistence and chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of single trace.	
Unit-III: Signal Generators and Analysis Instruments	**14 hrs**
Signal Generators: Block diagram, explanation and specifications of low frequency signal generators. Pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis. **Digital Instruments:** Principle and working of digital meters. Comparison of analog and digital instruments. Characteristics of a digital meter. Working principle of digital Voltmeter. **Digital Multimeter:** Block diagram and working of digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time-base stability, accuracy and resolution.	

Course Outcomes

After completing the course, the students will be able to

1) Understand the fundamental concepts and principles of instrumentation.
2) Learn principle of operation, working of different instruments like Voltmeter, Ammeter, Ohmmeter, Multimeter and AC Millivoltmeter.
3) Learn the functioning, specification, and applications of signal analyzing Instruments like cathode ray oscilloscope.
4) Work in industry with good skill.
5) Measure various parameters using proper instruments without errors.
6) Understand the importance of electronic instrumentation and measurements,

Books Recommended

1. Electronic Instrumentation and measurements-H S Kalsi
2. Electronic Instrumentation and measurements-David A Bell
3. A course in Electrical and electronic measurements and Instrumentation-A K Sawhney
4. Modern Electronics Instrumentation and measurement techniques- Helfrick Cooper
5. A text book in Electrical Technology- B. L. Theraja – S. Chand and Co.
6. Electronic Devices and Circuits, S. Salivahanan and N. S. Kumar, Third Ed.2012 Tata Mc-Graw Hill.

1. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta, Publisher: Tata McGraw-Hill, New Delhi, 2001

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8th Week
Written test-2	10%	1 hr	12th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	------	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science

04 - Year UG Honors programme:2021-22

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC / OEC

(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed.