J.S.S. BANASHANKARI ARTS, COMMERCE AND SHANTIKUMAR GUBBI SCIENCE COLLEGE, VIDYAGIRI, DHARWAD

Affiliated to Karnatak University, Dharwad

Accredited with 'A' Grade in last three cycles

तमसोमा ज्योतिर्गमय

Fourth Cycle NAAC Accreditation
SELF STUDY REPORT (SSR)

CRITERION - I

1.2.1 (QnM)

ELECTRONICS (CBCS)

Submitted to

NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL, BENGALURU

KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
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NAAC Accredited
'A' Grade 2014

website: kud.ac.in

No. KU /Aca(S&T)/ RIH-290/CBCS/2020-21/ 315 Date: 13 AUG 2020

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2020–21ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸಗಳಿಗೆ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್ ಸಿ.ಬಿ.ಸಿ.ಎಸ್. ಮಾದರಿಯ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

ಉಲ್ಲೇಖ: 1. DO No. 1-1/2016(SECY), dt. 10.08.2016.
2. Academic Council Res. No. 2, 21.05.2020.
3. KU/Aca(S&T)/RIH-194/20-21/71, dt. 08.06.2020.
4. KU/VCS/2020-21, dt. 11.08.2020.
5. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ 13.08.2020.

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳಿಗೆ ಸಂಬಂಧಿಸಿದಂತೆ, 2020–21ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸಗಳ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್‌ಗಳಿಗೆ ಸಿ.ಬಿ.ಸಿ.ಎಸ್. ಮಾದರಿ ಪಠ್ಯಕ್ರಮವನ್ನು ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದನೆಯನ್ನು (Pending Approval of Academic Council Meeting) ನಿರೀಕ್ಷೆಯಲ್ಲಿರಿಸಿ ಅಳವಡಿಸಲಾಗಿದೆ.

ಮುಂದುವರೆದು, ಈ ಮೇಲಿನ ಸಿ.ಬಿ.ಸಿ.ಎಸ್. ಪಠ್ಯಕ್ರಮವು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ www.kud.ac.in ದಲ್ಲಿ ಬಿತ್ತರಿಸಲಾಗಿದೆ ಎಂದು ಈ ಮೂಲಕ ತಿಳಿಸಲಾಗಿದೆ.

Hanuf 13/08/2020
(ಡಾ. ಹನುಮಂತಪ್ಪ ಕೆ.ಟಿ)
ಕುಲಸಚಿವರು

ಗೆ,
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ.

ಪ್ರತಿ ಮಾಹಿತಿಗಾಗಿ: ಡೀನರು, ಕಲಾ, ಸಮಾಜ ವಿಜ್ಞಾನ, ವಿಜ್ಞಾನ ಹಾಗೂ ತಂತ್ರಜ್ಞಾನ, ವಾಣಿಜ್ಯ, ಕಾನೂನು, ಶಿಕ್ಷಣ ಮತ್ತು ಮ್ಯಾನೇಜಮೆಂಟ್ ನಿಖಾಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

ಪ್ರತಿ:
1. ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕುಲಪತಿಗಳ ಕಾರ್ಯಾಲಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕುಲಸಚಿವರ ಕಾರ್ಯಾಲಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕುಲಸಚಿವರು(ಮೌಲ್ಯಮಾಪನ) ಕಾರ್ಯಾಲಯ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ನಿರ್ದೇಶಕರು, ಇಂಟರನೆಟ್ ಸೆಕ್ಷನ್, ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕವಿವಿ, ಧಾರವಾಡ.
5. ಅಧೀಕ್ಷಕರು, ಸಿಡಿಸಿ (ಸಂಯೋಜನೆ) ವಿಭಾಗ, ಕವಿವಿ, ಧಾರವಾಡ

CBCS syllabus w.e.f. 2020-21
B.Sc. FIRST SEMESTER
Optional Subject: ELECTRONICS(DSC-ELET:101)
BASIC ELECTRONICS
(Credits:Theory-04, Practicals-02) Theory: 60 Hours

Circuit Analysis(08hours):

Concept of voltage and urrentsources. Superposition theorem.Thevenin's theorem. Norton's theorem.Reciprocity theorem.Maximum power transfer theorem. Two port networks: z,y and h parameters and their interconversions.

Measuring Instruments(07 hours):

Principle of voltmeter, multirange voltmeter (AC and DC), loading effect.Principle of ammeter, multirange ammeter (AC and DC),Principle of Ohmmeter, series and shunt type ohmmeter. Multimeters: Analog and digital multimeters(qualitative).

CRO: Use of CRO (frequency, voltage ,phase, Lissajous pattern).

Junction Diode and its applications(15 hours):

p-n junction diode (Ideal and practical): Construction, Formation of depletion layer, and V-I characteristics. Static and dynamic resistance, dc load line and Quiescent point(Q).Zener diode: V-I characteristics, Reverse saturation current, Zener and avalanche breakdown.Rectifiers: Half wave rectifier, Full wave rectifierand bridgerectifier(Circuit diagrams, working and waveforms, ripple factor and efficiency). Filters: Shunt capacitor filter-working, output waveform and its role in power supply. Regulation: Line and load regulation. Zener diode as voltage regulator.

Bipolar Junction Transistor(BJT)&FET (15 hours):

Transistor, Types of transistors, characteristics of transistor in CE and CB configurations. Regions of operation (active, cut off and saturation), Current gains(α and β) and relations between them. dc load line and Q point. Transistor biasing circuits: Fixed Bias and Voltage Divider Bias(Thermal runaway, stability and stability factor S). h-parameter analysis of a transistor in CE mode.

FET:FET types, JFET-Construction, working, characteristics, parameters and the relation between them.

Amplifiers and Oscillators (15 hours):

Small signal analysis of single stage RC coupled CE amplifier using h-parameters. Expressions forinput & output impedance, current and voltage gains. Two stage RC Coupled CE amplifier and its frequency response. Class A, B and C amplifiers (qualitative).

Feedback in Amplifiers: Concept of feedback,negative and positive feedback, expression for gain with feedback (negative and positive feedback). Working of emitter follower circuit. Advantages of negative feedback.

Sinusoidal Oscillators: Barkhausen criterion for sustained oscillations. Phase shift, Wein bridge and Colpitt'soscillators-condition for oscillation and expression for frequency.

<u>Note:</u>

4. **Number of teaching hours per week are four.**
5. **Total teaching hours are inclusive of solving numerical problems on all the topics.**
6. **Preference may be given to solve maximum number of numerical problems.**

Reference Books:

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

List of first semester ELECTRONICS(DSC-ELEP:102) Experiments:

1. Measurement of amplitude, frequency &phase difference using CRO(Demonustartion only).
2. h-parameters of a two port network.
3. Verification of Thevenin's and Norton's theorems.
4. Verification of Superposition theorem/Reciprocity theorem.
5. Verification of maximum power transfer theorem.
6. Half wave rectifier and Full wave rectifier.
7. Bridge Rectifier with C- filter andπ- section filter.
8. Zener diode as voltage regulator.
9. FETcharacteristics.
10. Study of Fixed Bias and Voltage divider bias for CE mode.
11. Design a Single Stage RC coupled CE amplifier and study its frequency response.
12. Study of RC Phase Shift oscillator/Wein bridge oscillator.
13. Study of Colpitt's oscillator.

Note:

4. **Experiments are of four hours duration.**
5. **Minimum of Eight experiments to be performed.**
6. **Any new experiment may be added to the list with the prior approval from the BOS.**

CBCS syllabus w.e.f. 2020-21
B.Sc. SECOND SEMESTER
Optional Subject: ELECTRONICS(DSC-ELET:201)

LINEAR AND DIGITAL INTEGRATEDCIRCUITS

(Credits: Theory-04, Practicals-02) Theory: 60 Hours

Integrated circuits(03 hours):Introduction, classification ofIC's, comparsion between different IC's and advantages.

Operational Amplifiers& its applications (12 hours):Block Diagram of Op-amp, Characteristics of an Ideal and practical Op- amp(IC 741), Operational amplifier parametrs, Open and closed loop configurations and frequency response. Concept of virtual ground.

Applications: Inverting and Non-inverting amplifiers, summing and difference amplifier, differentiator, Integrator, Wein bridge oscillator, Comparator and Zero-crossing detector, and active low pass and high pass Butterworth filter (First order only).

Clock and Timer (IC 555): Introduction, Block diagram of IC 555, Astable and monostablemultivibrator circuits.

Number System,Boolean Algebra and Logic gates (15 hours):

Number System: Decimal, Binary, Octal and Hexadecimal number systems and their interconversions. Representation of signed and unsigned numbers.Addition and subtraction by 1's &2's complement method.BCD, Gray& ASCII code. Binary to Grey conversion and vice-versa.

Boolean algebra: Basic postulates and fundamental theorems of Boolean algebra,positive and negative logic.

Logic Gates: Study of basic gatesOR, AND, NOT. Derived gates NOR, NAND, XOR, XNOR. Universal property of NAND and NOR gates.Realisation of Boolean equation using logic gates. deMorgan'stheorems and its applications.Logic families: RTL, DTL, TTL, and CMOSand their characteristics.

Combinational Logic Analysis and Design (15 hours): Standard representation of logic functions (SOP and POS), minimization Techniques,Karnaughmapminimization up to 4variables for SOP.

Arithmetic Circuits: Half and Full Adder, Half and Full Subtractorand 4- bit binaryAdder and Subtractor. Two bit comparator,encoder,decimal to BCD Priorityencoder, decoder 2:4 using AND gates and 3:8 using NAND gates. BCD to decimaldecoder. Multiplexer (4:1 using gates) and demultiplexer (1:4 using gates).

Digital to analog(D/A) and Analog to Digital(A/D): 4 bit binary weighted and R-2R D-A converters, working, accuracy and resolution.A/D conversion characteristics, successive approximation ADC. (Mention of relevant ICs for all).

Sequential Circuits(15 hours): RS, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master-slave JK Flip-Flop.

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

Counters: Asynchronous counters-logic diagram, truth table and timing diagram of 3-bit ripple counter, 3-bit up-down asynchronous counter and decade counter. Ring Counter, Johnson counter and their applications.

Note:

1. **Number of teaching hours per week are four.**
2. **Total teaching hours are inclusive of solving numerical problems on all the topics.**
3. **Preference may be given to solve maximum number of numerical problems.**

Reference Books:

1. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000.
2. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011.
3. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed..
4. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009.
5. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
6. Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001.
7. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994).
8. R. L. Tokheim, Digital Principles, Schaum's Outline Series.
9. Digital Electronics, S.K. Mandal, 2010, 1st edition, McGraw Hill.

List of Second semester ELECTRONICS(DSC-ELEP:202) Experiments

1. Design inverting and non-inverting amplifier using Op-amp(741) for dc/ac voltages & study its frequency response.
2. Op-amp asan adder using inverting/non-inverting mode and comparator.
3. Op-amp as Integrator and Differentiator.
4. Wein bridge oscillator using an op-amp.
5. Design a Butterworth low pass active filter (1^{st} order) & study its frequency response.
6. Design a digital to analog converter.
7. Design a combinational logic system for (i) a givenBoolean expression and (ii) Truth table. Realise it using logic gates.
8. Half Adder and Full Adder/ Half Subtractor and Full Subtractor.
9. Seven segment decoder.
10. MonostableMultivibrator using IC 555 Timer.
11. JK Master-slave flip-flop using Flip-Flop ICs.
12. Counter using D-type/JK Flip-Flop ICs.
13. Grey to binary condition and vice-versa.
14. Verification of deMorgan’s theorem.

Note:

1. **Experiments are of four hours duration.**
2. **Minimum of Eight experiments to be performed.**
3. **Any new experiment may be added to the list with the prior approval from the BOS.**