No.BCU/BoS/Electronics-UG /330 /2022-23   Date: 13.12.2022.

NOTIFICATION

Sub: B.Sc. V & VI Semesters Electronics Syllabus of Bengaluru City University-reg.

Ref: 1.University Notification No.BCU/BoS/Science-UG Syllabus/87/2020-21
     dated.04.09.2020
    2. Recommendations of the Board of Studies in the Electronics (UG)
    3. Approval of the Vice-Chancellor dated.12.12.2022.
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In pursuance to the recommendations of the BoS in Electronics (UG) and the approval of the Vice-Chancellor cited at reference (2 & 3) above, the B.Sc. V & VI Semester Electronics Syllabus of Bengaluru City University effective from the academic year 2022-23, is hereby notified for information of the concerned.

The copy of the Syllabus is notified in the University Website: www.bcu.ac.in for information of the concerned.
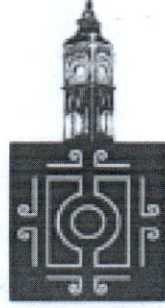
REGISTRAR

To:
    The Registrar (Evaluation), Bengaluru City University, Bengaluru.

Copy to;

    1. The Dean, Faculty of Science, BCU.
    2. The Chairman & Members of BoS in Electronics (UG), BCU.
    3. The P.S. to Vice-Chancellor/Registrar/Registrar (Evaluation), BCU.
    4. Office copy / Guard file / University Website: www.bcu.ac.in

BENGALURU CITY UNIVERSITY

B.Sc. Electronics
(V & VI Semester)

(CHOICE BASED CREDIT SYSTEM)
(SEMESTER SCHEME)
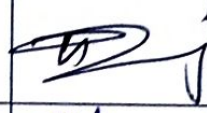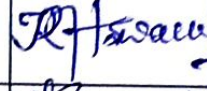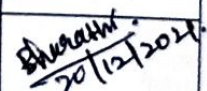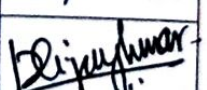
2022-23 onwards
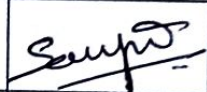
Proceedings of the BoS in Electronics (UG).

Proceedings of the Board of studies (BoS) in Electronics (UG) meeting held on December 20th, 2021 in the Department of Electronic Science, Jnana Bharathi Campus, Bangalore University, Bangalore-560056.

The Members were present for the meeting are;

Sl No.	Name	Designation	Signature
1.	Dr. J T Devaraju, Registrar (Evaluation), Bangalore University, Bengaluru. Professor, Department of Electronic Science, Bangalore University, Bengaluru – 560056	Chairman	20/12/1
2.	Sri. K M Thipperudra Swamy Associate Professor, Department of Electronics, Vivekananda Degree College, Bengaluru – 560055	Member	
3.	Sri. S M Mruthunjaya Swamy Associate Professor, Department of Electronics, Vijaya College, R V Road, Bengaluru – 560004	Member	
4.	Sri. S Sanjeev Associate Professor, Department of Electronics, Vijaya College, Jayanagar, Bengaluru – 560011	Member	
5.	Dr. H J Thontadharya Associate Professor, Department of Electronics, Vijaya College, R V Road, Bengaluru – 560004	Member	Absent
6.	Sri. K G Lakshminarayana Associate Professor, Department of Electronics, Vijaya College, Jayanagar, Bengaluru – 560011	Member	
7.	Smt. Rajashri Padaki Associate Professor, Department of Electronics, Seshadripuram First Grade College, Yelahanka New town, Bengalure-560064	Member	Absent
8.	Dr. Mohana H K Assistant Professor, Department of Electronics, Seshadripuram First Grade College, Yelahanka New town, Bengaluru -560064	Member	Absent
9.	Dr Ravi Kolarkar G Associate Professor, Department of Electronics, Nrupathunga University, Bengaluru -560001	Member	
10	Dr. Bharathi Assistant Professor, Department of Electronics, Maharani Cluster University, Bengaluru -560001	Member	Bharathi 20/12/2021
11	Sri. Vijaya Kumar A Patil Associate Professor, Department of Electronics, Basaveshwara College of Commerce, Arts and Science, Bengaluru -560010	Co-opted Member	

The Chairman extended warm welcome to all the BoS Members and thanked them for accepting the assignment.

Resolutions:

1. The board prepared V & VI Semester CBCS Scheme Syllabus (2019-20) for both theory & practical, it was unanimously approved after deliberations.

2. The board discussed & approved the Question Paper Pattern under NEP-2020, for Discipline Specific Core (DSC) Subject "Electronics" for both Theory & Practical.

3. The board also discussed & approved the Question Paper Pattern under NEP-2020, for Open Elective (OE) Subject "Electronics"

4. The Scheme of awarding marks for Theory, Practical as well as Internal Assessment (IA) was discussed and approved.

5. It was resolved that, number of students for practical's shall be 10 (Ten) per batch per teacher.

6. The board also Prepare & approved the Panel of Examiners for the academic year 2021-22

7. Constitution and Approved the BoE in Electronics (UG) for the academic year 2021-22

Finally, the Chairman extended vote of thanks to all BoS members for their active participation.

Chairman

Dr. J.T. Devaraju
Professor
Dept. of Electronic Science
Bangalore University
Bangalore - 560 056

UNIT 1
Noise and Transmission lines
7 hours

Noise-Introduction, internal and external noises, signal to noise ratio and noise figure-Numerical examples.

Transmission lines - types and equivalent circuit of T-lines, primary and secondary constants. Reflection co-efficient, VSWR and CSWR-numerical examples, losses and Distortions in T-lines. Propagation of waves-ground wave, sky-wave and space wave propagations, ionosphere and its effects.

UNIT 2
Analog Modulation techniques
10 hours

Block diagram of electronic communication system. Modulation-need and types of modulation-AM, FM & PM. Amplitude modulation – representation, modulation index, expression for instantaneous voltage, power relations, frequency spectrum, DSBFC, DSBSC and SSBSC (mention only), AM collector modulator. Limitations of AM. FM - definition, modulation index, FM frequency spectrum diagram, Bandwidth requirements, frequency deviation and carrier swing, FM generator-varactor diode modulator. Block diagram of AM transmitter and FM transmitter with AFC, qualitative study of pre-emphasis. Comparison of AM and FM. Numerical examples.

UNIT 3
Radio Receivers
9 hours

Demodulation- AM detection – principles of detection, linear diode and Transistor detector-circuits, principle of working and waveforms. FM detector – principle, slope detector-circuit, working. AM superheterodyne receiver– principle, block diagram, function of each stage with waveform, qualitative study of AGC. FM super heterodyne receiver– principle, block diagram, function of each stage with waveform, qualitative study of de-emphasis. Characteristics of radio receivers-qualitative study of sensitivity, selectivity, signal to noise ratio, fidelity, stability, image frequency and its rejection.

Unit 4:
Antennas
8 hours

Radiation Mechanism, Wire Radiators in space-Resonant Antennas-radiation pattern and current distribution for different lengths, Non Resonant Antenna, Antenna parameters-Gain, Directive gain, Power gain, Bandwidth, Beam width, Polarisation, Efficiency, Radiation Resistance, Total effective resistance, Derivation for the Power radiated by antenna and expression for Radiation

resistance. Ungrounded and Grounded antennas, Effect of antenna height. Folded dipole, Numerical examples wherever applicable. Qualitative study of helical antenna and loop antenna.

Unit 5
Television
8 hours

Introduction, scanning, interlaced scanning, T.V. Camera tube (vidicon), composite video signal – blanking and synchronizing pulses, vestigial side band transmission, TV systems and standards – Comparison between American and European systems. Block diagrams of monochrome TV transmitter and receiver. Basic principles of colour TV, primary and secondary colours, colour combinations, chromo and luminance processing as per PAL system. Colour TV receiver (PAL). Concept of CCTV, HDTV, Picture in Picture, Picture phones, TV games, Numerical examples wherever applicable.

Text Books:
1. Electronic Communication, George Kennedy, 3rd edition, TMH.
2. Electronic Communication, Roddy and Coolen, 4th edition, PHI.

Reference Books:
3. Electronics Communications Systems, Wayne Thomasi, 5th edition, Pearson Ed.
4. Digital Communication System : Ronald J. Tocci

Semester V - Practical V
EL-501P   COMMUNICATION LAB

1. Amplitude modulator and Amplitude demodulator
2. FM modulator using IC8038
3. Pre –emphasis and De- emphasis
4. Three way Audio cross over network.
5. IF amplifier
6. Class C tuned amplifier
7. AGC
8. VCO using IC 566
9. Frequency mixer
10. Time Division Multiplexing and de multiplexing
11. Frequency Multiplier
12. Study of Sensitivity, Selectivity and Fidelity of an AM radio receiver

Note: Minimum of 8 experiments to be performed.

B.Sc. Electronics Syllabus
Semester V – Paper 6
EL-502T MICROPROSSESOR and ELECTRONIC INSTRUMENTATION

UNIT 1   9 hrs
Introduction to Microprocessor

Introduction, applications, basic block diagram, speed, word size, memory capacity, classification of microprocessors (mention different microprocessors being used)

Microprocessor 8085: Features, architecture -block diagram, internal 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.

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 and machine control instructions.

UNIT 2   9 hrs
Stack operations and Microprocessor Programming

Stack operations, subroutine calls and return operations. Delay loops, use of counters, timing diagrams-instruction cycle, machine cycle, T- states, time delay-numerical examples.

Programs for data transfer and memory operations (direct & indirect addressing), addition and subtraction of two 8-bit & 16- bit numbers, multiplication, display of smallest / largest number in a given array of numbers, sorting of numbers in descending / ascending order. Number of 1's and 0's in a given byte, testing for zero condition. 1's and 2's complements. Verification of truth tables of logic gates, program to add two N byte numbers, program to generate Fibonacci series up to the limit, program to find the factorial of a number, program to find the GCD of two integer numbers.

UNIT 3   8 hrs
I/O instructions and Interfacing

I/O instructions and, interrupts in 8085. Basic interfacing concepts, compatible ICs of µP 8085, data transfer, synchronous I/O data transfer using interrupts. Memory interfacing – address decoding, interfacing RAM and ROM.

Interfacings I/O devices– input port, output port, IN & OUT instructions, interfacing input devices (interfacing matrix key board-block diagram), interfacing output devices (LED display interfacing-block diagram).

PPI IC 8255– features, pin diagram, functional block diagram, ports & their modes.

UNIT 4:   8 hrs
Measurement systems, Transducers & Electronic Instrumentation

Introduction to general measurement system – characteristics - definition –static & dynamic. Transducers, types – resistive, capacitive and inductive transducers, strain gauge, LVDT   (variable inductive transducers) temperature transducers- thermo couple, thermistors – ultrasonic temperature transducer, photoelectric transducers, pressure transducers-MIC and and loud speaker, signal conditioning (concept only), amplifier – chopper amplifier –carrier amplifier - lock in amplifier.

UNIT 5:   8 hrs
Introduction to Bio-medical instruments

Origin of bio-electric signals, resting & action potential – propagation, physiological transducers – active & passive transducer for medical application – diagnostic & analytical equipments -electrodes for ECG, EEG, and EMG, block diagram of ECG and EEG systems.

Semester V - Practical VI
EL-502P   8085 Microprocessor programs and Interfacing.

1. Prpgraom to add (with carry) 8 bit numbers - Binary and BCD
2. Program to subtract two 8 bit numbers - Binary and BCD
3. Program to add & Subtract two 16-bit numbers (with carry.
4. Program to multiply two 8-bit numbers.
5. Program to find GCD of two numbers.
6. Program to find the ratio (division) of two 8-bit numbers.
7. Program to find the number of 1's & 0's in a given byte and Program to display the smallest number in a given array of numbers.
8. Program to sort the given array of numbers (descending order) and to find the smallest number.
9. Program to display decimal up counting (00-99).
10. Program to verify the truth table of logic gates.
11. Interfacing 20 keys Matrix Keyboard
12. Interfacing Seven-segment display

13. Interfacing DAC card to convert digital input to equivalent analog output (suggested to use <u>IC DAC 08 and IC 741</u>)
14. Interfacing a stepper motor.

(Any EIGHT Experiments – any two Interfacing experiments compulsory)

Text Books

1. Microprocessor Architecture, Programming and Applications with 8085 Ramesh S.Gaonkar - Wiley Eastern Limited- IV Edition.
2. Fundamentals of Microprocessor & Microcomputer: B. Ram—Danpat Rai Publications.
3. Instrumentation devices and systems: Rangan, Sarma, Mani, TMH
4. Handbook of biomedical instrumentation: Khandpur R S, TMH
5. Electronic Instrumentation- H. S. Kalsi, TMH, 2004

Reference Books

1. Microprocessor and Interfacing- Programming & Hardware, Douglas hall, 2e TMH, 1991
2. Modern Digital Electronics, R.P. Jain–Tata Mc- GRAW hill–2nd Edition.
3. Microprocessor and its Applications- R.Theagarajan, S. Dhanasekaran and S. Dhanapal-New Age International Publishers.
4. Microprocessors and Microcontrollers-B.P singh, Galgotia publications.
5. The intel Microprocessors 8086/8088,80186,386,486, architecture, Programming and interfacing – Barry. B. Bray, PHI, New Delhi.
6. Microprocessor Lab Manual- G.T Swamy- Lakshmi Publications 2006.
7. Instrumentation Measurement and analysis: Nakra B C, Chaudry K K, TMH
8. Measurement systems applications and design: Doeblin E O, McGraw Hill, 1990.
9. Electron measurements and instrumentation techniques: Cooper W D and Helfric A D, PHI, 1989.
10. Biomedical instrumentation and measurements: Leslie-Cromwell, Fred J Weibell, Erich A Pfeiffer, PHI, 1994.
11. Instrumentation, Measurement& Feedback by Barry Jones, PHI
12. Electronic Instrumentation and Measurements, David A Bell, PHI / Pearson Education, 2006.
13. Electronics & electrical measurements, A K Sawhney, Dhanpat Rai & sons, 9th edition.
14. Biomedical Instrumentation - M.Arumugham, Anuraçlha Agencies
15. Bio Medical Instrumentation Engineering – Leslee and Chronewell.

B.Sc. Electronics Syllabus
Semester VI – Paper 7
EL-601T   COMMUNICATION-II

UNIT 1   8 hours
Digital communication

Introduction to pulse and digital communications, digital radio, sampling theorem, types- PAM, PWM, PPM, PCM – quantization, advantages and applications, digital modulations (FSK, PSK, and ASK). Advantage and disadvantages of digital transmission, characteristics of data transmission circuits – Shannon limit for information capacity, bandwidth requirements, data transmission speed, noise, cross talk, echo suppressors, distortion and equalizer, MODEM– modes, classification, interfacing(RS232).

UNIT 2   9 hours
RADAR Systems

RADAR– principles, frequencies and powers used in RADAR, maximum Unambiguous range, detailed block diagram of pulsed RADAR system, RADAR range equation-derivation, factors influencing maximum range, effect of ground on RADAR antenna characteristics, doppler effect, MTI RADAR-block diagram, CW RADAR-block diagram, advantages, applications and limitations, FM CW RADAR-block diagram, numerical examples wherever applicable.

UNIT 3   8 hours
Satellite communication

Introduction, need, satellite orbits, advantages and disadvantages of geostationary satellites. Satellite visibility, satellite system – space segment, block diagrams of satellite sub systems, up link, down link, cross link, transponders (C- Band), effect of solar eclipse, path loss, ground station, simplified block diagram of earth station. Satellite access – TDMA, FDMA, CDMA concepts, comparison of TDMA and FDMA, Satellite antenna (parabolic dish antenna), GPS-services like SPS & PPS.

UNIT 4   9 hours
Optical Fiber Communication

Introduction – need for OFC. Block diagram of OFC system. Fiber optic cables, light propagation through fiber – step index fiber, graded index fiber, Snell's law, numerical aperture (derivation). Types of optical fiber cables, light sources – requirements, LEDs and semiconductor Laser diodes. Photo detectors – PN, PIN and avalanche photodiodes. Losses in optical fibers – Rayleigh Scattering, absorption, leaky modes, bending, joint junction Losses. Advantages and disadvantages of OFC over metallic cables.

Unit 5   8 hours
Cellular Communication and Wireless LANs

Concept of cellular mobile communication – cell and cell splitting, frequency bands used in cellular communication, absolute RF channel numbers (ARFCN), frequency reuse, roaming and hand off, authentication of the SIM card of the subscribers, IMEI number, concept of data encryption, architecture (block diagram) of cellular mobile communication network, CDMA technology, CDMA overview, simplified block diagram of cellular phone handset, Comparative study of GSM and CDMA, 2G, 3G and 4G concepts.
Major components of local area network-Primary characteristics of Ethernet-mobile IP, OSI model, Wireless LAN requirements-concept of Bluetooth, WiFi and WiMAX.

Semester VI - Practical VII
EL-601P   COMMUNICATION and MICROCONTROLLER LAB

PART- A
Communication Experiments.
1. ASK modulator and demodulator
2. FSK modulation
3. PWM and PPM
4. PAM modulator and demodulator
5. Band Elimination Filter
6. Two stage RC coupled Amplifier-Determination of Mid band gain of individual stages, overall gain and the concept of loading effect.
7. Study of switched mode regulator using PWM
8. Characteristics of OFC

Note: Minimum of 5 experiments to be performed in PART- A.

PART- B
Experiments on Microcontroller Programming
01. Program to add (with carry) and subtract two 8-bit numbers.
02. Program to find 2's complement of a 16-bit number.
03. Program to find the sum of N 8-bit numbers.
04. Program to find largest of N numbers.
05. Program to find smallest of N numbers
06. Program to find whether the given data is palindrome.

07. Program to arrange the numbers in ascending order.

08. Program to arrange the numbers in descending order .

09. Program to interchange Two one – byte numbers.

10. Program to interchange N one – byte numbers.

Note: Minimum of 5 experiments to be performed in PART- B.

Text Books:

1. Electronic Communication systems, Kennedy & Davis, IVth edition- TATA McGraw Hill.
2. Introduction to RADAR systems – Skolnik- McGraw Hill.
3. Advanced Electronic Communication systems, Wayne Tomasi- 6th edition, Low priced edition- Pearson education

Reference Books:

1. Electronic Communication systems, Fundamentals through Advanced, Wayne Tomasi - Vth edition.

B.Sc. Electronics Syllabus
Semester VI – Paper 8
EL-602T   MICROCONTROLLERS

UNIT 1   10 hrs

Introduction to Microcontrollers

Basic block diagram, comparison of microcontroller with microprocessors, comparison of 8 bit, 16 bit and 32 bit microcontrollers.

Overview of 8051 series–comparison of 8051, 8052, 8031.

Other Microcontroller families (Mention only) – Maxim 89C420, 89C440, 89C450

Atmel Corporation AT89C51, AT 89LV51, AT89C1051, AT89C2051, AT89C52.

Microcontroller 8051- architecture -internal block diagram, key features of 8051, pin diagram, memory organization, Internal RAM memory, Internal ROM. General purpose data memory, special purpose/function registers, external memory.

Counters and timers – 8051 oscillator and clock, program counter, TCON, TMOD, timer counter interrupts, timer modes of operation. Input / output ports and circuits/ configurations, serial data input / output – SCON, PCON, serial data transmission modes.

UNIT 2   10 hrs
8051- Interrupts, Addressing modes and Instruction set
Interrupts – IE, IP, time flag interrupts, serial port interrupt, external interrupts, reset, interrupt control, interrupt priority, interrupt destinations & software generated interrupts.

Addressing modes–immediate addressing, register addressing, direct and indirect addressing,

Data transfer instructions – internal data move, external data move, code memory read-only data move, Push and Pop and data exchange instructions.

Logical Instructions – byte level logical operations, bit level logical operations, rotate and swap operations.

Arithmetic Instructions – flags, incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic, simple programs in assembly language.

UNIT 3   9 hrs
8051 programming in C
Jump and call instructions – jump and call program range, jumps, calls and subroutines, interrupts and returns, simple example programs in assembly language.

8051 programming   using C– Data types and time delays in 8051C, I/O programming, logic operations, data conversion programs, accessing code ROM space and data serialization.

Timer / Counter Programming in 8051–Programming 8051 timers, counter, Programming, programming timers 0 and 1 in 8051 C , Example programs.

UNIT 4:   9 hrs
Interfacing with 8051
Basic interfacing concepts and interrupts, Programming–8051 interrupts, programming Timer interrupts, programming the external hardware interrupts. Schematic diagrams and basic concepts of Interfacing of 8051 to keyboard, seven segment display, stepper motor, DAC, ADC and traffic light controller circuits.

UNIT 5:   4 hrs
PIC microcontrollers

Core features of PIC microcontrollers, overview of various PIC microcontroller series.

PIC 16F877A-features, pin diagram, I/O ports, interfacing with LCD.

Semester VI - Practical VIII
EL-602P   PROJECT WORK

- Students in a group, not exceeding **THREE**, should Design, Fabricate and Assemble ONE Electronic project in their respective colleges. The Department Faculty is required to guide the project work.
    - Each student should Prepare a report and submit at the time of practical examination duly certified by the concerned Faculty & HOD.
    - Department Faculty shall ensure that the entire project work is carried out in their respective colleges by utilising the practical classes assigned to practical VIII and shall be required to give the Seminar on the project.

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