**ALAGAPPA UNIVERSITY, KARAIKUDI**

**NEW SYLLABUS UNDER CBCS PATTERN (w.e.f.2017-18)**

**B.Sc. ELECTRONICS – PROGRAMME STRUCTURE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sem** | **Part** | **Course****Code** | **Title of the Course** | **Cr.** | **Hrs./ Wk** | **Max. Marks** |
| **Int.** | **Ext.** | **Total** |
| I | I | 711T | **Tamil/Other Languages –I** | 3 | 6 | 25 | 75 | 100 |
| II | 712E | **English – I**  | 3 | 6 | 25 | 75 | 100 |
| III | 7BEL1C1 | **Core – I** – Electronic Devices and Circuit Analysis | 4 | 6 | 25 | 75 | 100 |
| 7BEL1P1 | **Core – II** – Electronic Devices and Circuit Analysis Lab  | 4 | 6 | **40** | **60** | 100 |
|  | **Allied–I (Theory Only)** **(or)****Allied–I** (**Theory cum Practical)** | 54 | 53 | 2515 | 7560 | 10075 |
|  | **Allied Practical – I** | - | 2\*\* | -- | -- | -- |
| IV | 7NME1A /7NME1B /7NME1C | **Non Major Elective – I:****(A)** jkpo; nkhopapd; mbg;gilfs;/ **(B)** ,f;fhy ,yf;fpak; / **(C)** Communicative English | 2 | 1 | 25 | 75 | 100 |
|  |  **Total (Allied Theory only)** | **21** | **30** | **--** | **--** | **600** |
|  |  **Total (Allied Theory cum Practical)** | **20** | **30** | **--** | **--** | **575** |
| II | I | 721T | **Tamil/Other Languages –II** | 3 | 6 | 25 | 75 | 100 |
| II | 722E | **English – II**  | 3 | 6 | 25 | 75 | 100 |
| III | 7BEL2C1 | **Core – III** – Electronics Circuits  | 4 | 5 | 25 | 75 | 100 |
| 7BEL2P1 | **Core – IV** – Electronics Circuits Lab  | 4 | 6 | **40** | **60** | 100 |
|  | **Allied–II-(Theory Only) (or)****Allied–II-(Theory cum Practical)** | 54 | 53 | 2515 | 7560 | 10075 |
|  | **Allied Practical – I** | 2 | 2 | 20 | 30 | 50 |
| IV | 7BES2 | Environmental Studies | 2 | 2 | 25 | 75 | 100 |
|  |  **Total (Allied Theory only)** | **21** | **30** | **--** | **--** | **600** |
|  |  **Total (Allied Theory cum Practical)** | **22** | **30** | **--** | **--** | **625** |
| III | I | 731T | **Tamil/Other Languages –III** | 3 | 6 | 25 | 75 | 100 |
| II | 732E | **English – III**  | 3 | 6 | 25 | 75 | 100 |
| III | 7BEL3C1 | **Core – V** – Digital Electronics | 4 | 6 | 25 | 75 | 100 |
| 7BEL3P1 | **Core–VI**–Digital Electronics Lab  | 4 | 4 | **40** | **60** | 100 |
|  | **Allied–III-(Theory Only) (or)****Allied–III-(Theory cum Practical)** | 54 | 53 | 2515 | 7560 | 10075 |
|  | **Allied Practical – II** | -- | 2\*\* | -- | -- | -- |
| IV | 7NME3A/ 7NME3B/ 7NME3C | **Non Major Elective – II** **(A)** ,yf;fpaKk;nkhopg;gad;ghLk;/ (**B** )goe;jkpo; ,yf;fpaq;fSk;  ,yf;fpatuyhWk;/ (**C**) Effective Employability Skills | 2 | 1 | 25 | 75 | 100 |
|  |  | 7SBS3A1/ 7SBS3A2/7SBS3A3 | **Skill Based Subject – I**  | 2 | 2 | 25 | 75 | 100 |
|  |  V | 7BEA3 | Extension Activities  | 1 | -- | 100 | -- | 100 |
|  |  |  **Total (Allied Theory only)** | **24** | **30** | **--** | **--** | **800** |
|  |  |  **Total (Allied Theory cum Practical)** | **23** | **30** | **--** | **--** | **775** |
| IV | I | 741T | **Tamil/Other Languages –IV** | 3 | 6 | 25 | 75 | 100 |
| II | 742E | **English – IV**  | 3 | 6 | 25 | 75 | 100 |
| III | 7BEL4C1 | **Core–VII**–Analog Integrated Circuits  | 4 | 6 | 25 | 75 | 100 |
| 7BEL4P1 | **Core – VIII** – Analog Integrated Circuits Lab | 4 | 3 | **40** | **60** | 100 |
|  | **Allied – IV** (Theory Only) **Allied – IV** (Theory cum Practical) | 54 | 53 | 2515 | 7560 | 10075 |
|  | **Allied Practical – II** | 2 | 2 | 20 | 30 | 50 |
| IV | 7SBS4B1/ 7SBS4B2/7SBS4B3 | **Skill Based Subject – II** | 2 | 2 | 25 | 75 | 100 |
| 7BVE4/ 7BMY4/ 7BWS4 | **(4) Value Education / Manavalakalai Yoga / Women’s Studies** | 2 | 2 | 25 | 75 | 100 |
|  |  **Total (Allied Theory only)** | **23** | **30** | **--** | **--** | **700** |
|  |  **Total (Allied Theory cum Practical)** | **24** | **30** | **--** | **--** | **725** |
| V | III | 7BEL5C1 | **Core–IX**–Communication Electronics | 4 | 5 | 25 | 75 | 100 |
| 7BEL5C2 | **Core – X** – Microprocessor Programming and Interfacing  | 4 | 5 | 25 | 75 | 100 |
| 7BEL5P1 | **Core–XI**– Communication Electronics and Microprocessor Lab  | 4 | 6 | **40** | **60** | 100 |
| 7BELE1A/7BELE1B/7BELE1C/ |  **Elective – I - A)** Electronic Instrumentation **(or) B) P**ersonal Computer Hardware **(or)****C)** Printed Circuit Board Design | 5 | 5 | 25 | 75 | 100 |
| 7BELE2A/7BELE2B/7BELE2C | **Elective – II: A)** Medical Electronics **(or) B)** VLSI Design **(or)** **C)** Modern Communication Systems | 5 | 5 | 25 | 75 | 100 |
| IV | 7SBS5A4/7SBS5A5/7SBS5A6/7SBS5A7 | **Skill Based Subject – III**  | 2 | 2 | 25 | 75 | 100 |
| **Skill Based Subject – IV**  | 2 | 2 | 25 | 75 | 100 |
|  |  **Total** | **26** | **30** | **--** | **--** | **700** |
| VI | III | 7BEL6C1 | **Core – XII** – Power Electronics  | 4 | 5 | 25 | 75 | 100 |
| 7BEL6C2 | **Core – XIII** – Photonics and Optoelectronics | 4 | 5 | 25 | 75 | 100 |
| 7BEL6C3 | **Core – XIV** – Microcontroller and Embedded Systems  | 4 | 5 | 25 | 75 | 100 |
| 7BEL6P1 | **Core –XV-** Embedded and Power Electronics Lab | 4 | 6 | **40** | **60** | 100 |
| 7BELE3A/7BELE3B/7BELEPR | **Elective – III- A)** Biomedical Instrumentation **(or) B)** Industrial Electronics **(or) C)** PROJECT |  5 |  5 |  2540\* |  7560\* |  100 |
| IV | 7SBS6B4/7SBS6B5/7SBS6B6/7SBS6B7 | **Skill Based Subject – V**  | 2 | 2 | 25 | 75 | 100 |
| **Skill Based Subject – VI**  | 2 | 2 | 25 | 75 | 100 |
|  |  **Total** | **25** | **30** | **--** | **--** | **700** |
|  **Grand Total** | **140** | **180** | **--** | **--** | **4100** |

**\*\* University Examinations will be held in the Even Semesters only.**

**B.Sc. ELECTRONICS**

**I YEAR – I SEMESTER**

**COURSE CODE: 7BEL1C1**

**CORE COURSE – I – ELECTRONIC DEVICES AND CIRCUIT ANALYSIS**

**Unit – I Passive Devices, Networks and Theorems:**

**Passive Devices:** Resistance, Capacitance and Inductance **Passive networks**: Concept of voltage and current sources – KVL and KCL- Application to simple circuits (AC and DC) consisting of resistors and sources (one or two) - Node voltage analysis and method of mesh currents. **Network theorems (DC and AC)**: Superposition Theorem–Thevenin's Theorem– Norton's Theorem–Maximum power transfer Theorem–Millman Theorem- Reciprocity Theorem – Application to simple networks.

**Unit - II Network Analysis ,Filter and Resonance Circuit:**

**RC and RL Circuits**: Transient response of RL and RC circuits with step input– time constants. Frequency response of RC and RL circuits – **Types of Filters**: Low pass filter – High pass filter – frequency response - Passive differentiating and integrating circuits**. Resonance**: Series resonance and parallel resonance RLC circuits – Resonant frequency – Q factor – Band width – Selectivity.

**Unit - III Semiconductor Material Properties:**

Atomic Structure - Atomic Energy level diagram - Electronic configuration of Elements - Energy Band Theory of Crystal - Energy Band Structures and Conduction in Insulator, Semiconductor and Metal - Classification of semiconductor - conduction in semiconductor - Carrier

Concentration in Intrinsic Semiconductor - Mass Action Law - Variation in Semiconductor Parameter with Temperature - Drift Current and Diffusion Currents - Carrier Life Time - Continuity Equation.

**Unit – IV Semiconductor Diodes and its Applications:**

Theory of PN Junction diode - Diode Current Equation - Space Charge Capacitance - Diffusion Capacitance - Break down in PN Junction diode - Zener Diode and Zener Break down - Varactor Diode - Tunnel Diode - Gunn Diode - PIN Diode - Avalanche Photo Diode - LASER Diode.

**Unit – V Semiconductor Transistors:**

Bipolar Junction Transistor construction -Transistor biasing- Operation of NPN and PNP Transistor - Transistor Parameters - CE configuration - CB Configuration - CC configuration - Construction and operation of N channel JFET - Characteristic Parameters of the JFET - Expression for Saturation Drain Current -JFET as VVR- MOSFET- Enhancement MOSFET - Depletion MOSFET - Biasing of MOSFET - Construction and Operation of UJT.

**Text Books:**

1. Electronic Devices and Circuits , S.Salivahanan, N. Sureshkumar and A. Vallavaraj

 - Tata McGraw Hill Second Edition - 2008

2. Circuits and Networks Analysis and Synthesis, A.Sudhakar and Shyammohan S. Palli, Tata McGraw Hill - 5th Edition 2015.

**Books for Reference:**

1. Electronic Devices and Circuits, Jacob Millman and C. Halkias, Tata McGraw Hill

2. A Text Book of Applied Electronics, Dr R.S. Sedha, S.Chand and Co Ltd, Revised ` Edition -2013.

3. Integrated Circuits and its Applications, Jacob Millman and C. Halkias, Tata McGraw Hill

♣♣♣♣♣♣♣♣♣♣

**I YEAR – I SEMESTER**

**COURSE CODE: 7BEL1P1**

**CORE COURSE – II – ELECTRONIC DEVICES AND CIRCUIT ANALYSIS LAB**

**(Any Fourteen Experiments)**

1. Familiarization with

 a) Resistance in series, parallel and series – Parallel.

 b) Capacitors & Inductors in series & Parallel.

 c) Multimeter – Checking of components.

 d) Voltage sources in series, parallel and series – Parallel

 e) Voltage and Current dividers

2. Measurement of Amplitude, Frequency & Phase difference using CRO.

3. Verification of Kirchoff’s Laws.

4. Verification of Norton’s theorem.

5. Verification of Thevenin’s Theorem.

6. Verification of Superposition Theorem.

7. Verification of the Maximum Power Transfer Theorem.

8. RC Circuits: Time Constant, Differentiator, Integrator.

9. Designing of a Low Pass RC Filter and study of its Frequency Response.

10. Designing of a High Pass RC Filter and study of its Frequency Response.

11. Study of the Frequency Response of a Series LCR Circuit and determination of its (a) Resonant Frequency (b) Impedance at Resonance (c) Quality Factor Q (d) Band Width.

12. Study of the Frequency Response of a Parallel LCR Circuit and determination of its (a) Resonant Frequency (b) Impedance at Resonance (c) Quality Factor Q (d) Band Width.

13. Characteristics of PN Junction Diode

14. Reverse Bias Characteristics of Zener Diode

15. Characteristics of CB Configuration of BJT

16. Characteristics of CE Configuration of BJT

17. Characteristics of JFET

18. JFET as Voltage variable Resistance

19. Characteristics of MOSFET

20. Characteristics of UJT

♣♣♣♣♣♣♣♣♣♣

**I YEAR – II SEMESTER**

**COURSE CODE: 7BEL2C1**

**CORE COURSE – III – ELECTRONICS CIRCUITS**

**Unit – I Rectifiers And Regulators**

Rectifiers - Half wave, Full wave, bridge – average value- RMS value- PIV- ripple factor-Efficiency – Comparison of Rectifiers – Filters – C, LC and π – Types of Voltage Regulators – Zener diode Shunt Regulator – Transistor Shunt Regulator - Transistor Series Regulator – Step down Transformer - Linear mode Power supplies.

**Unit - II Bipolar Junction Transistor Amplifiers:**

Transistor as an Amplifier - Bias Stability - Methods of Transistor Biasing - Biasing Compensation - Hybrid model for Two Port Network - Analysis of Transistor Amplifier Circuit using h parameter- Simplified CE hybrid model - Single Stage Amplifier - Small Signal Analysis of BJT Amplifier - FET Amplifier Small Signal Model - Low Frequency Response of Transistor Amplifier - Frequency Response of FET Amplifier.

**Unit – III Large Signal and Feedback Amplifiers:**

Classification based on biasing condition - Class A large Signal Amplifier and its efficiency - Class B Push Pull Amplifier and its efficiency - MOSFET Power Amplifier - Basic concept of feedback - Effects of Negative Feedback-Types of Feedback Connection - Methods of Feedback identification topology and feedback factor - Stability of Feedback Amplifiers

**Unit - IV Multistage and Tuned Amplifiers:**

Different Coupling Schemes used in Amplifier - General Analysis of Cascaded Amplifier - RC coupled Amplifier - Transformer Coupled Amplifier - Direct Coupled Amplifier - Frequency Response of Multistage Amplifier - Small Signal Tuned Amplifier - Large Signal Tuned Amplifier - Stability of Tuned Amplifier - RF Amplifier - Video Amplifier.

**Unit - V Oscillators and Wave Shaping Circuits:**

Classification of Oscillators - Condition for Oscillation (Barkhausen Condition) - General form of LC Oscillator - Hartley Oscillator - Colpitts Oscillator - RC oscillator - Wien Bridge Oscillator - Crystal Oscillator - Oscillators using FET - UJT Relaxation Oscillator - Clipping and Clamping Circuits - Multivibrators.

**Text Book:**

1. Electronic Devices and Circuits , S.Salivahanan, N. Sureshkumar and A. Vallavaraj

 - Tata McGraw Hill Second Edition - 2008

**Books for Reference:**

1. Electronic Devices and Circuits, Jacob Millman and C. Halkias, Tata McGraw Hill.

2. A Text Book of Applied Electronics, Dr R.S. Sedha, S.Chand and Co Ltd, Revised ` Edition -2013.

3. Integrated Electronics and its Applicationss,Jacob Millman and C. Halkias, Tata

 McGraw Hill.

♣♣♣♣♣♣♣♣♣♣

**I YEAR – II SEMESTER**

**COURSE CODE: 7BEL2P1**

**CORE COURSE – IV- ELECTRONICS CIRCUITS LAB**

**(Any Fourteen Experiments)**

1. Construct of Half wave rectifier and study its parameters.
2. Construct of Full wave rectifier and study its parameters.
3. Construct of Bridge Rectifier and study its parameters.
4. Construct 6Volt Power supply using filter and Zener diode.
5. Construct Transistor voltage regulator.
6. Construct RC coupled CE Amplifier and study its frequency response.
7. Construct feedback CE Amplifier and study its frequency response.
8. Construct PUSH-PULL Amplifier using transistors.
9. Construct FET Common Source Amplifier and Study its Frequency response.
10. Construct RF Amplifier and study its frequency Response.
11. Construct Tuned Transformer Coupled Amplifier and Study its Frequency Response.
12. Construct Video Amplifier and Study its Frequency Response.
13. Construct Phase shift Oscillator and calculate its frequency
14. Construct Hartley Oscillator and calculate its frequency
15. Construct Collpitt’s Oscillator and calculate its frequency
16. Construct Diode Clipper and Clamper circuits and study its waveforms using CRO.
17. Construct Astable Multivibrator using transistor and study its wave form using CRO.
18. Construct Monostable Multivibrator using transistor and study its wave form using CRO.
19. Construct Monostable Multivibrator using transistor and study its wave form using CRO.
20. Construct UJT relaxation Oscillator and study its wave form using CRO.

♣♣♣♣♣♣♣♣♣♣

**II YEAR – III SEMESTER**

**COURSE CODE: 7BEL3C1**

**CORE COURSE – V- DIGITAL ELECTRONICS**

**Unit – I Minimization Techniques**

Number Systems – Floating Point Representation – 1’s and 2’s Complements – Signed number Addition and Subtraction – Codes – Boolean Algebra – Demorgan’s Theorem – Canonical and Standard Forms – Minimization Techniques – Simplification of Boolean Functions using Karnaugh Map.

**Unit – II Combinational Logic Design**

Logic Gates – Universal Gates – Half Adder – Full Adder – Half Subtractor – Full Subtractor – Parallel Binary Adder and Subtractor (7483) – BCD Adder – Binary Multiplier and Divider – Multiplexers – De multiplexers –(74138) 3 to 8 Decoder – 74148 Priority Encoder – BCD to Seven Segment Decoder 7447/48 – Parity Generator and Checkers .

**Unit – III Flip-Flops**

Basic Latch circuits – S-R Flip-Flop – D Flip-Flop – J-K Flip-Flop – T Flip-Flop – Triggering of Flip-Flops – Asynchronous Inputs in Flip-Flops – Master Slave J-K Flip Flops – Racing Condition – . **Registers:** 4- bit Shift Register – SISO Shift Register – SIPO Shift Register – PISO Shift Register – PIPO Shift Register – Ring Counter.

**Unit – IV Counters And Registers**

**Asynchronous Counters**: Ripple Counter – Decade Counter – Up/ Down Counter **Synchronous Counters:** Up/Down Counter – Design of MOD- n Counters – BCD Decade Counter.

**Unit – V Memories And Logic Families**

Classification of Memories – Basic Memory Structure – ROM- RAM – PLD- Characteristics of Digital IC’s – Current Sourcing and Current Singing Logic – RTL –DTL – TTL – TTL NAND Gate – TTL Parameter – ECL – I2 Logic – MOSFET Logic – CMOS Logic – Characteristics of CMOS Logic.

**Text Book:**

1. Digital Electronics, S.Salivahanan, S.Arivazhagan, Vikas Publishing -2012

**Books for Reference:**

 1. Digital Design - M. Morris Mano - Pearson Education (3rd Edition)

2. Digital Principles – Leach, Malvino, TMH (6th Edition).

3. Fundamental of Digital Circuits- Anand Kumar- Prentice Hall of India Pvt. Ltd.

4. Digital Electronics – Dr. R. S. Sedha – S. Chand Publications.(3rd Revised

 Edition).

♣♣♣♣♣♣♣♣♣♣

**II YEAR – III SEMESTER**

**COURSE CODE: 7BEL3P1**

**CORE COURSE – VI- DIGITAL ELECTRONICS LAB**

**(Any Fourteen Experiments)**

1. Logic Gates Using IC's and verify its truth table
2. Design Logic gates using Universal NAND gate and verify its truth table.
3. Design Logic gates using Universal NOR gate and verify its truth table.

4.. Design and Implementation of Code conversion using logic gates

5. Implementation of SOP and POS logical functions using universal gates.

6. Implementation of Half Adder and Full Adder using logic gates.

7. Implementation of Half Subtractor and Full Subtractor using Logic Gates

8. Implementation of Binary Adder and Subtractor using IC7483

9. Verification of Functionality of Multiplexer

10. Verification of Functionality of De multiplexer

11. Verification of functionality of Decoder.

12. Verification of functionality of Encoder.

13. Verification of the functionality of BCD to Seven segment decoder/driver.

14. Verification of functionality of Parity Generator and Checker

15. Implement S-R, D, J-K, T flip flops using logic Gates/IC’s

16. Functional verification of universal shift registers using IC 7495.

17. Design and implementation of Ring counter using shift register.

18. Design and Implementation of 4 Bit Ripple counter

19. BCD Decade Counter

20. Mod Counter

♣♣♣♣♣♣♣♣♣♣

**II YEAR – IV SEMESTER**

**COURSE CODE: 7BEL4C1**

**CORE COURSE – VII- ANALOG INTEGRATED CIRCUITS**

**Unit – I Planar Ic Fabrication Processes**

Classification of IC’s – Silicon Wafer Preparation – Epitaxial Growth – Oxidization – Photolithography – Diffusion – Ion Implantation – Isolation Techniques – Metallization – Assembly Processing and Packaging – Fabrication of NPN Transistor ,Diode and JFET – Fabrication of Resistance, Inductance and Capacitance – Surface Mounting Technology.

**Unit – II DC and AC OP-Amplifiers**

IC 741 Op-Amp Terminals – Power Supply Connections – Ideal Op-Amp – Negative Feed Back – DC characteristics – Basic Op-Amp Applications – Instrumentation Amplifier – AC Amplifiers – V to I and I to V Convertor – Peak Detector – Sample and Hold Amplifier – Log and Antilog Amplifier – Multiplier and Divider – Differentiator – Integrator – LM 320 Audio Amplifier.

**Unit – III Comparators, Waveform Generators And Active Filters**

Comparator – Zero Crossing Detector – Schmitt trigger – Phase Shift Oscillator – Wien Bridge Oscillator – Square Wave Generator – Triangular wave Generator – IC XR 2206 Waveform Generator- Voltage Regulator using 78xx – Dual Voltage Regulator – Variable Voltage regulator using IC 723 – Second Order Low Pass Filter – Second Order High Pass Filter.

**Unit – IV 555-TIMER and PLL**

555 Timer Pin Details – Description of Functional Block Diagram – Monostable Operation – Astable Operation – PWM – FSK – PLL: Basic Principles – Analog Phase Detector – Digital Phase Detector – IC NE 565 Block Diagram- Derivation of Lock in Range – Derivation of Capture Range – FM and FSK Demodulation – VCO using NE 566.

**Unit – V D/A and A/D Convertors**

Basic DAC Techniques – Weighted Resistor DAC – R-2R Ladder Type DAC -Monolithic DAC 0808 – Types of ADC – Flash ADC – Counter Type ADC – Successive Approximation ADC – Dual Slope ADC.

**Text Book:**

1. Linear Integrated Circuits, D.Roy Choudhury, Shail B. Jain, New Age International Publishers, Fourth Edition – 2010.

**Books for Reference:**

1. Op-Amps and Linear Integrated Circuits, Ramkant A.Gayakward, PHI - 2005
2. Operational amplifiers and Linear Integrated circuits,R. F. Coughlin and F. F. Driscoll, Pearson Education -2001
3. Integrated Electronics, J. Millman and C.C. Halkias, Tata McGraw-Hill - 2001
4. Electronic Principles A.P.Malvino,6th Edition , Tata McGraw-Hill -2003
5. OP-AMP and Linear Integrated Circuits, K.L.Kishore, Pearson- 2011

♣♣♣♣♣♣♣♣♣♣

**II YEAR – IV SEMESTER**

**COURSE CODE: 7BEL4P1**

**CORE COURSE – VIII- ANALOG INTEGRATED CIRCUITS LAB**

**(Any Fourteen Experiments)**

1. DC Characteristics of OP-Amp
2. Inverting and Inverting Summing Amplifier
3. Non Inverting and Non Inverting Summing Amplifier
4. Differential Amplifier
5. Voltage Follower and Instrumentation Amplifier
6. Differentiator and Integrator using OP-Amp
7. V to I and I to V convertor
8. Construct Peak Detector
9. Construct Comparator and Zero Crossing Detector
10. Schmitt Trigger
11. Construct Op-Amp Square Wave Generator
12. Construct Op-Amp Wien Bridge Oscillator
13. Construct Waveform Generator using XR2206
14. Construct Audio Amplifier using LM 320
15. Construct Voltage regulator using 78XX]
16. Construct Dual Voltage Regulator using 78XX and 79XX
17. Construct variable Power supply using IC723
18. Construct Astable Multivibrator using 555 Timer
19. Construct Monostable Multivibrator using 555 Timer
20. Construct VCO using NE 566

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BEL5C1**

**CORE COURSE – IX- COMMUNICATION ELECTRONICS**

**Unit - I**  **Electronic communication**:

 Block diagram of an electronic communication system- Electromagnetic Spectrum-Band designations and Applications - Need for Modulation - Concept of channels and Base-Band signals- Concept of Noise - Types of Noise - Signal to noise ratio - Noise Figure- Noise Temperature-Friss Formula.

**Unit - II Amplitude Modulation:**

Amplitude Modulation, modulation index and frequency spectrum - Generation of AM (Emitter Modulation)- Amplitude Demodulation (diode detector)- Double Side Band Suppressed Carrier generation Balanced Modulator - SSBSC generation Filter Method - SSB Detection - VSB modulation - AM Transmitter - AM Super Heterodyne Receiver.

**Unit - III**  **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 (Balanced Slope Detector, PLL). Block diagram of FM Transmitter and Receiver Comparison between AM, FM and PM.

**Unit – IV Pulse Analog and Code Modulation**

**Pulse Analog Modulation:** Channel capacity- Sampling theorem- PAM- PDM -PPM

modulation and detection techniques- Multiplexing- TDM and FDM.

**Pulse Code Modulation:** Need for digital transmission, Quantizing, Uniform and Nonuniform

Quantization, Quantization Noise, Companding, Coding, Decoding, Regeneration.

**Unit - V Digital Carrier Modulation Techniques**:

Block diagram of digital transmission and reception- Information capacity, Bit Rate, Baud Rate and M-ary coding- Amplitude Shift Keying (ASK)- Frequency Shift Keying (FSK)-Phase Shift Keying (PSK)- Binary Phase Shift Keying (BPSK) - Quadrature Phase Shift Keying (QPSK)

**Text and Reference Books:**

1. Electronic communication systems, G. Kennedy and B. Davis,TMH-1999
2. Electronic communication systems: Fundamentals through Advanced, W. Tomasi, Pearson Education (2007)
3. Communication Systems: Analog and Digital, R. P. Singh and S. D. Sapre, Tata McGraw Hill
4. Communication electronics: Principles and applications, L. E. Frenzel,TMH- 2002
5. Digital and analog communication systems, L.W. Couch II, Pearson Education (2005)
6. Communication theory, T.G.Thomas & S. Chandra Sekhar, Tata McGraw Hill (2006)
7. Analog and Digital Communication, H.P.Hsu, Tata McGraw-Hill (2006)

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BEL5C2**

**CORE COURSE– X-MICROPROCESSOR PROGRAMMING AND INTERFACING**

**Unit – I 8085 Architecture And Programming**

The 8085 Microprocessor Pin Details – 8085 Architecture –, Microprocessor initiated operations and bus Organization - Demultiplexing AD0-AD7 – Generation of control Signals -Programming Model of 8085 - Instructions and timing - addressing modes - Instruction Set - Programming techniques – Simple Programs.

**Unit – II Interfacing I/O Devices Using 8255**

Basic Interfacing concept – Memory Mapped I/O – I/O mapped I/O – Memory Interfacing – Programmable I/O 8255A - LED interfacing – DIP Switch Interfacing – Seven Segment Display Interfacing – Traffic Light Interfacing – Stepper Motor interfacing – Hex Key Board Interfacing – LCD Interfacing – ADC Interfacing – DAC Interfacing – Temperature controller.

**Unit – III Programmable Interfacing Peripherals:**

 DMA Data Transfer – Interfacing 8257 DMA Controller-8085 Interrupts – Interfacing 8259 – Serial Data Communication – Interfacing 8251 and RS 232 - 8253/54 Timer and Counter

**Unit – IV 8086 Hardware Architecture**

 Pin Description – Operating Modes of 8086 - Pin Description for Minimum Mode - Pin Description for Maximum Mode - Register Organization of 8086 - BIU - EU - External Memory Addressing –Minimum Mode Bus Cycles – Memory Interfacing – Minimum Mode System Configuration – Interrupt Processing – Direct Memory Access.

 **Unit – V Programming The 8086**

8086 Addressing modes - Instruction set – Data Transfer Group – Control Transfer Group – Arithmetic Group -Logical Group – Control Transfer Group – Miscellaneous Instruction Groups – Simple Programs.

**Text Books:**

1. Microprocessor Architecture, programming and Applications with the 8085, Ramesh S. Goanker, Penram International Publishing, 5th Edition(Units I,II,and III)
2. Advanced Microprocessors and Interfacing, Badri Ram, Tata McGraw Hill,2008 (Unit IV and V)
3. Microprocessors and Microcontrollers Architecture,Programming and System Design 8085,8086,8051,8096, Krishna Kant, PHI learning Pvt.Ltd -2013(Unit IV and V).

**Books for Reference:**

1. Microprocessor and interfering programming and Hardware - By Doughles

V. Hall - Tata Mc Hill.

 2. Microprocessor and microcomputer - Based system Design - CRC press - M.

 Rafiquzzman.PHI

 3. 8086/8088 microprocessors - Brey - PHI.

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BEL5P1**

**CORE COURSE – XI -COMMUNICATION ELECTRONICS AND MICROPROCESSOR LAB**

**(Any Fourteen Experiments)**

1. DSB Amplitude Modulation and Demodulation
2. Frequency Modulation and Demodulation
3. Pulse Amplitude Modulation
4. Pulse Width Modulation
5. Amplitude Shift Keying
6. Frequency Shift Keying
7. Binary Phase Shift Keying
8. PLL Parameters using NE 565.
9. Study of TDM using IC 7475.
10. Frequency Multiplier using PLL.
11. Interfacing with DIP switches and LED
12. Interfacing with Seven Segment LED
13. Interfacing with Traffic Light controller.
14. Interfacing with Stepper Motor
15. Interfacing with DC Motor speed control using PWM
16. Interfacing with HEX Keyboard
17. Interfacing with LCD
18. Interfacing with DAC and Generate wave forms using DAC
19. Interfacing with ADC with LM35
20. Serial communication using RS232.

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BELE1A**

**ELECTIVE COURSE - I (A) - ELECTRONIC INSTRUMENTATION**

**Unit – I Measurement Principles**

Measurement of physical parameters- Measurement system block diagram- Measurement Characteristics like Accuracy, Precision, Sensitivity, Linearity, Resolution, Reliability, Repeatability - Errors.

**Unit – II Bridges and Transducers**

DC Bridge: Wheatstone Bridge – AC Bridges and Their Applications – Maxwell Bridge – Hay Bridge – Wien Bridge – Strain Gages –LVDT-Piezoelectric - Thermocouple – Thermistor – PN Junction Transducer - Photo resistors - Photodiodes - Photovoltaic cell.

**Unit – III Test and Measuring Instruments**

Working Principle, Block diagram, Specification and Operating procedure for: Voltmeter -Ammeter - Analog Multimeter - Electronic Voltmeter- LCR Meter-DMM – DFM **-** Introduction to Oscilloscopes - Cathode ray tube- vertical and horizontal deflection system- delay lines - oscilloscope probes - elementary ideas about storage and sampling oscilloscope- Applications of oscilloscope.

**Unit – IV Signal Generation And Test Systems**

**Signal Generators** : Audio Oscillator- Function Generators- Pulse Generator -RF Generator - Sweep generator- Random Noise Generator.

**Probes and Connectors:** Test leads, shielded cables, connectors, low capacitance probes, high voltage probes, RF demodulator probes, special probes for IC’s, current probes. Testing an Audio Amplifier – Testing a Radio Receiver.

**Unit – V Special Measurement Systems**

 **Wave Analyzers:** Operation of frequency selective wave analyzers and heterodyne wave analyzers and their application. Spectrum analyzer. Digital Thermometer- Lux meter –Tachometer – Speedometer- pH meter - Humidity meter.

**Text and Reference Books:**

1. Modern Electronic Instrumentation and measurement techniques, Alber D. Helfrick, WilliamD.Cooper, PHI, 2012
2. Instrumentation Devices & Systems, Rangan, Mani, Sharma TMH
3. A course in electrical and electronic measurements and instrumentation, Sawhney A.K. Dhanpat Rai & Company
4. Electronic Instrumentation, Kalasi H. S. ,TMH
5. Digital Instrumentations, Bouwens, TMH

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BELE1B**

**ELECTIVE COURSE-I (B) -** **PERSONAL COMPUTER HARDWARE**

**Unit – I Fundamentals of Computer:**

Brief introduction with block diagram. SMPS – ATX/NLX Power Supply – display adapter – alphanumeric character generation system – MDA,CGA, HGA, EGA, VGA, SVGA, AGP.

**Unit – II** **Organization of motherboard** :

 Form factors – AT, ATX motherboards – different sections of mother boards – Latest Intel microprocessor – Comparison – co-processor – numeric processor – cache memory - chipsets – Bus mastering – ISA, EISA, VESA, PCI,EPCI, PCM CIA- comparison -USB architecture.

**Unit – III Memories**

 RAM, DRAM –RAM – Refreshing – SIMM, DIMM, DDR technologies memory mapping –conventional memory, upper memory, Extended memory, expanded memory –Magnetic recording techniques – FM, MFM, RLL, EFM, Floppy disk – FAT, Beet area – Directory area, data area – floppy drive – FDC – Hard disk – construction– low level and high level formatting – HDD interfaces – HDC – optical recording techniques – CD – CD recording – DVD Blue ray disc.

**Unit – IV Input and Output**

Keyboard – organization – matrix – keyboard controllers – interfacing of keyboard – key switches – types -keyboard connectors – PS/2 connector, USB – mouse – working principles –– opto electronic mouse, optical mouse , wireless Keyboard , wireless mouse introduction– light pen – joystick – tablets – scanner- pointer-touch pad. Printers - dot-matrix – inkjet, laser printers –LCD -TFT-LED monitors introduction.

**Unit - V System assembling procedure**

BIOS - CMOS setup - preventive maintenance – viruses -data recovery tools - safety precautions - troubleshooting tools - error codes – beep codes - POST sequences - diagnostic software - procedure of installing internet – UPS- latest system specifications Desktop-Laptop-Notebook – Palmtop.

**Books for Reference:**

1. Troubleshooting, maintaining & repairing PCs – Stephen.J.Bigelaw

2. IBM PC clones – B.Govinda Rajulu

3. Upgrading and Repairing Pc, Scott Muller

4. Modem all about sereies, Manohar Lottia, BPB Publications

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BELE1C**

**ELECTIVE COURSE - I - (C) -** **PRINTED CIRCUIT BOARD DESIGN**

**Unit – I BASICS OF PCB**

Advantages of PCB – Evolution of PCB – Components of PCB – Classification of PCB – Manufacturing of Basic PCBs – Challenges in Modern PCB Design and Manufacture.

**Unit – II PCB LAYOUT PLANNING AND DESIGN**

Reading, Drawings and Diagrams – General PCB Design Considerations – Mechanical Design Considerations – Electrical Design Considerations – Conductor Pattern – Component Placement Rules – Cooling Requirements and Packaging Density – Layout Design – Layout Design Check List – Documentation.

**Unit – III DESIGN RULES**

Design Rules for Analog Circuits – Design Rules for Digital Circuits – Design Rules for High Frequency Circuits – Design Rules for Power Electronics Circuits.

**Unit – IV ARTWORK AND IMAGE TRANSFER TECHNIQUE**

Basic Approach to Manual Artwork - General Design Guidelines for Artwork Preparation – Artwork Generation Guidelines – Film Master Preparation – CAD – Basic CAD Operation – PCB Design Layout – Image Transfer Technique – Screen Printing – Pattern Transferring Technique Photo Printing – Laser Direct Imaging.

**Unit – V COPPER CLAD LAMINATE./ETCHING**

Manufacture of Laminates – Properties of Laminates – Phenolic Laminates – Epoxy Laminates – Silicon Laminates – Etching Solutions – Etching Parameter – Etching Techniques.

**Text / Books for Reference:**

1. Printed Circuit Boards Design, Fabrication, Assembly and Testing, TMH-2005
2. Printed Circuit Board Design and Technology,Walter C.Bosshart, TMH-1983.

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BELE2A**

**ELECTIVE COURSE - II (A) – MEDICAL ELECTRONICS**

**Unit – I Bio Electric Signals and Electrodes**

Origin of Bio Electric Signals – Transport of Ions through Cell Membrane – Resting Potential – Action Potential – Electrodes – Half Cell Potential – Electrode Jelly Interface – Micro Electrode – Needle Electrode – Surface Electrode – Chemical Electrode – PH Electrode – PCo2 Electrode – PO2 Electrode.

**Unit – II Bio Potential Recorders**

ECG- ECG Lead Configuration – Bipolar Limb Leads – Augmented Unipolar Limb Leads – Uni Polar Chest Leads – ECG Recorder Design Setup – ECG wave form and its Characteristics – PCG – Heart sounds and its Characteristics – PCG Recording Setup- EEG – Origin of EEG – Action and Evoked Potential – Brain waves – Placement of Electrodes – EEG Recording Setup – Modern EEG Unit – EMG – EMG Recording Setup – Determination of Conduction Velocity.

**Unit – III Physiological Assist Devices**

 Pacemakers – Energy Requirements to Excite Heart Muscle – Methods of Stimulation – Modes of Operations – Ventricular Asynchronous Pacemaker – Ventricular Synchronous pacemaker – Ventricular Inhibited Pacemaker–Atrial Synchronous Pacemaker – Atrial Sequential Ventricular Inhibited Pacemaker – Defibrillators – Types of Defibrillators – DC Defibrillator – Synchronized Defibrillator – Square Wave Defibrillator.

**Unit – IV Non Electrical Parameter Measurement**

Temperature measurement – Respiratory Measurement – Heart Rate and Pulse rate Measurement – Blood Pressure Measurement – Ultrasonic Blood flow meter – Hearing Aids.

**Unit – V Bio-Telemetry**

Elements of Bio Telemetry System- Design of Bio-Telemetry System – Radio Telemetry System–Single Channel Telemetry System: Transmission of Bioelectrical Signals– Hartley Type FM Transmitter – Pulsed Hartley Oscillator – Radio Telemetry with Sub Carrier – Multiple Channel Telemetry System.

**Text Books:**

1. Bio Medical Instrumentation, Dr.M.Arumugam, Anuraha Publications 1997
2. Hand Book of Bio Medical Insturmentation – R.S.Khanpur, Tata McGraw Hill

Second Edition -2003

1. Biomedical Electronics and Instrumentation, S.K.Venkata Ram, Galgotia Publications Pvt.Ltd, First Edition -2000.

**Books for Reference:**

1. Biomedical Instrumentation and Measurements, Leslie Cromwell, PHI Pvt. Ltd, Second Edition -2013.
2. Introduction to Biomedical Equipment Technology, Joseph J.Carr, Pearson Education, Fourth Edition – 2001.

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BELE2B**

**ELECTIVE COURSE - II (B) – VLSI DESIGN**

**Unit - I**  **Metal Oxide Semiconductor (MOS)**:

 Introduction to basic principle of MOS transistor -CMOS inverter - Large Signal MOS Models (long channel) for digital design. MOS SPICE model, MOS device layout: Transistor layout- Inverter layout - CMOS digital circuit layout.

**Unit - II**  **MOS Inverter:**

Inverter principle - Depletion and enhancement load inverters- the basic, transfer characteristics- logic threshold- Noise margins- Dynamic behavior-Propagation Delay and Power Consumption.

**Unit - III Combinational MOS Logic Design**:

Static MOS design- Pass Transistor logic- complex logic circuits. Sequential MOS Logic Design - Static latches, Flip flops & Registers-Dynamic Latches & Registers.

**Unit – IV Memory Design:**

ROM & RAM cells design. Dynamic MOS design- Dynamic logic families and performances- Interconnect & Clock Distribution- Interconnect delays- Cross Talks- Clock Distribution.

**Unit - V VHDL**

Module, Delays Brief Description - Data Flow Style- Behavioral Style-Structural Style-Mixed Design Style- Simulating Design. Language Elements: Keywords- Identifiers- White Space Characters- Comments- Format- Integers- Reals and Strings. Logic Values, Data Types-Net Types- Undeclared Nets-Scalars and Vector Nets- Register Type- Parameters- Operands- Operators- Types of Expressions- Gate Level Modeling - MOS Switches, Bidirectional Switches- Gate Delay- Array Instances, Implicit Nets- Illustrative Examples (Both Combinational and Sequential Logic Circuits).

**Books for Reference:**

1. Kang&Leblebigi “CMOS Digital IC Circuit Analysis & Design”-McGraw Hill,2003.

2. Rabey, “Digital Integrated Circuits Design”, Pearson Education, Second Edition,2003.

3. Weste and Eshraghian, “Principles of CMOS VLSI design” Addison-Wesley, 2002.

4. Basic VLSI design: Douglas A Pucknell, Kamran Eshraghian, PHI, 3rd edition

5. A VHDL Primer - By J.Bhasker , 3rd edition - PHI, New Delhi, 2007

6. Circuit design with VHDL by Volnei. Pedroni – PHI, New Delhi, 2007

7. Digital Systems Design using VHDL by Charles H.Roth Jr.- PWS Pub.,1998

8. Fundamentals of Digital Logic with VHDL Design – by Stephen Brown and Zvonko

 Vranesic - TMH. 2002

♣♣♣♣♣♣♣♣♣♣

**III YEAR – V SEMESTER**

**COURSE CODE: 7BELE2C**

**ELECTIVE COURSE - II (C) - MODERN COMMUNICATION SYSTEMS**

**Unit - I Optical Communication**

Basic Optical Communication System – Classification of Fibers – Ray theory – NA and Multipath Dispersion of SI and GI Fibers – Attenuation – Optical Sources and Detectors - Point – Point Link System – Link Power Budget – Rise Time Budget – Wave Length Division Multiplexing – Optical Fiber Network – Bus Topology – Ring Topology – Star Topology.

**Unit - II Cellular Communication**

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.

**Unit - III Mobile Network 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.

**Unit – IV 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.

**Unit -V Satellite Access**

TDMA, FDMA,CDMA Concepts- Comparison of TDMA And FDMA- Satellite Antenna (Parabolic Dish Antenna) - GPS-Services Like SPS & PPS.

**Local Area Networks (LAN):** Primary Characteristics of Ethernet-Mobile IP - OSI Model-

Wireless LAN Requirements-Concept of Bluetooth, Wi-Fi And Wimax.

**Books for Reference:**

1. W. Tomasi, Electronic Communication Systems: Fundamentals through Advanced,

 Pearson Education, 3rd Edition

2. Martin S. Roden, Analog & Digital Communication Systems, Prentice Hall,

 Englewood Cliffs, 3rd Edition

3. Modern digital and analog Communication systems- B. P. Lathi, 4rd Edition 2009

 Oxford University press.

4. ThiagarajanVishwanathan, Telecommunication Switching Systems and Networks,

 Prentice Hall of India.

5. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2nd

 Edition, Pearson Education Asia-2001

6. Andrea Goldsmith, Wireless communications, Andrea Goldsmith, Cambridge

 University, 2015.

♣♣♣♣♣♣♣♣♣♣

**III YEAR – VI SEMESTER**

**COURSE CODE: 7BEL6C1**

**CORE COURSE – XII- POWER ELECTRONICS**

**Unit – I Power Electronic Devices**

Power Transistor - SCR Characteristics – Two Transistor Analogy – Series and Parallel connections of SCRs – Gate Characteristics of SCR – DIAC construction and working –V-I Characteristics – TRIAC Construction and Working – Modes of Operations - Thyristors Turn ON Methods.

**Unit – II Firing, Commutating and Protecting Circuits**

 **Firing Circuits**:Diode-Resistance Firing Circuit.- Diode-Resistance-Capacitance Firing Circuit.- UJT Firing Circuit. - Pulse Transformer Firing Circuit- Diac Firing Circuit. **Turn-off Methods:**Line Commutation- Load Commutation- Forced Commutation- Gate Turn-off. **Commutating Circuits:**Voltage Commutation- Current Commutation- Pulse Commutation – Overvoltage Protection -Over current Protection –Gate Protection - Over temperature Protection.

 **Unit – III Controlled Rectifiers**

 **Half-Wave Controlled Rectifiers:**Half-Wave Controlled Rectifier with Resistive Load - Half Wave Controlled Rectifier with Resistive and Inductive Load- Half-Wave Controlled Rectifier with Inductive Load and Flywheel Diode. **Full-Wave Controlled Rectifiers:**Mid-Point Configuration with Resistive Load-Full-Wave Controlled Rectifier with Transformer Leakage-Reactance and Load Reactance-Full-Wave Controlled Bridge Rectifiers.

**Unit – IV Inverter, Chopper and Switch Mode Regulator** Principle of Voltage-Driven Inversion -Principle of Current-Driven Inversion -Sine Wave Inverter - Square Wave Inverter **-**Thyristorised Centre-Tapped Load Inverter- Centre-Tapped Supply Inverter- Bridge Inverters - Pulse-Width Modulated Inverters**.**

**Choppers:** Principle of a Chopper -Step-Down Chopper-Step-Up Chopper-Step-Up/Step-Down Chopper – voltage commutated Chopper -**Switch Mode Regulator:**Buck Regulator - Boost Regulator- Buck-Boost Regulator- Fly Back Regulator–Forward Regulator – Push Pull Regulator
**Unit – V Applications of Power Electronics**

Solid State Switching circuits – Solid State Relays - **Battery Charger:**Battery Charging Regulator- Emergency Lighting System **- Power Supply:**Linear Power Supply- Switch Mode Power Supply (SMPS)- Uninterrupted Power Supply (UPS)- **Motor Drive:** Induction Motor Drive- Synchronous Motor Drive- DC Motor Drive- Universal Motor Drive- Stepper Motor Drive.

**Text Book:**

1. Power Electronics and its Applications, Alok Jain, Penram International

**Books for Reference:**

1. Power electronics: Circuits, Devices and Applications , M.H. Rashid third Edition (2004),Pearson Education
2. Power electronics Laboratory : theory , Practice & Organization, O.P. Arora Narosa Publishing house-2007
3. Power Electronics,Mohan, undeland,Robbins,John Wiley&Sons Third Edition-2006
4. Power Electronics, P.C. Sen Tata Mc Graw Hill -1998

♣♣♣♣♣♣♣♣♣♣

**III YEAR – VI SEMESTER**

**COURSE CODE: 7BEL6C2**

**CORE COURSE – XIII- PHOTONICS AND OPTOELECTRONICS**

**Unit – I**  **Introduction to LASER**

Coherence – Block Body Radiation - Boltzmann Distribution Law - Basic principle of lasers – Absorption – Spontaneous Emission - stimulated emission - Einstein’s Relation – Condition for Stimulated Emission – Condition for Light Amplification – Population Inversion – Pumping – Pumping Methods – Metastable State – The Principle Pumping Scheme - Laser rate equations for Two, Three and Four level Laser Systems.

**Unit – II Semiconductor** **LASER**

 LASER Diode Principle – LASER mode -Threshold current – Heterojunction Lasers –Modulation Response of ILD- ILD Structures- Distributed Feedback Laser - Quantum Well Laser -. Lasik Surgery and Holography.

**Unit – III**  **LED. LCD and Plasma Display**

LED‐ Basic Principle of Operation - Radiative Recombination Process - The internal quantum efficiency – External Quantum Efficiency -Double Hetrostructure, Response time of LED - Carrier Configuration and Modulation Bandwidth – ELED - SLED . Liquid Crystal Display ‐ Construction - Basic principle of emission - Plasma Display‐ Construction - Basic principle of emission.

**Unit – IV Optical Detector**

Basic Principle of optoelectronic Detection - Optical absorption Coefficient and Photo Current -Quantum Efficiency - Responsivity - Long Wave Length Cut-off - silicon P‐N photodiodes- Hetrojunction photodiodes - Schottkey barrier diode - P‐I‐N photodiodes- Avalanche Photo diode -Photoconducting Detectors.

**Unit – V Photovoltaic Systems Analysis and Design:**

P-N Junction and formation of Solar Cells – Solar Cell Characteristics and Measurement – General Photo Voltaic Systems – PV Module – PV Array – The Diode – The Power Conditioning Unit – MPPT – Battery Charger/ Discharger – Inverter for AC Loads – Mounting of Panels for an Array – Sun Tracking – Concept of MPPT – Topology of MPPT.

**Text Books:**

1. Nityanand Choudhary Richa Verma – Laser Systems and Applications , Prentice Hall of India – 2011.( Unit I &II )
2. Pallab Bhattacharya, Semiconductor Optoelectronic Devices, Second Edition, Prentice Hall of India – 2005 (Unit III and IV)
3. R.P.Khare, Fiber Optics and Optoelectronics,Oxford University Press,2004(Unit III and IV)
4. A.K. Mukerjee, Nivedita Thakur, Photovoltaic System Analysis and Design, Prentice Hall of India – 2011 ( Unit -V)

♣♣♣♣♣♣♣♣♣♣

**III YEAR – VI SEMESTER**

**COURSE CODE: 7BEL6C3**

**CORE COURSE – XIV-MICROCONTROLLER AND EMBEDDED SYSTEMS**

**Unit – I 8051 Architecture**

Features of 8051 – Pin description of 8051 - 8051 Microcontroller Architecture - 8051 oscillator and clocks - Program counter and data pointer – A and B Registers – Bank Registers -Flags –PSW - Internal RAM - Stack and Stack pointer - special Function Registers - memory organization – External Memory Interface.

**Unit – II Programming 8051**

Programming model – Addressing Modes – Data Transfer Instructions - Arithmetic Instructions - Logical Instructions – JUMP and Loop Instructions – Time Delay - CALL instructions – Push and Pop Instructions – Boolean Variable Manipulation Instructions – simple Programs.

**Unit – III Interrupts, Programming Parallel And Serial I/O Ports**

8051 Parallel I/O Ports – Port 0 – Port 1- Port 2 – Port 3- I/O Port Programming – I/O bit manipulation Programming - 8051 Interrupts – Initializing 8051 Interrupts – Interrupt Priority.- Serial Communication – Serial Communication Modes – Basics of serial communication – 8051 connection to RS232 - 8051 serial Port Programming – Programming the serial communication interrupt

**Unit – IV Programming Timers/Counters And Ext. Interrupts**

Timers and Counters – Timer and Counter Modes – Mode 0- Mode 1 – Mode 2 – Mode 3 Programming 8051 Timers – Counter Programming – Programming Timers 0 and 1 in 8051 – Programming Timer Interrupts – Programming External Hardware Interrupts.

**Unit – V Interfacing Techniques**

LED Interfacing – DIP switch Interfacing – Seven Segment Display Interfacing – Traffic controller interfacing – Stepper Motor Interfacing – DC motor Interfacing and PWM - Key board interfacing – LCD display Interfacing - Interfacing LM 35 temperature sensor DAC Interfacing – ADC Interfacing.

**Text Books:**

1. The 8051 Microcontroller Architecture, Programming and Applications, Kenneth J. Ayala – Penram International Publication, Second Edition -2004.
2. The 8051 Microcontroller and Embedded Systems using Assembly and C,Mohammed Ali Maszidi, Prentice Hall of India, Second Edition-2006.

 cGraw-Hill (2006)

♣♣♣♣♣♣♣♣♣♣

**III YEAR – VI SEMESTER**

**COURSE CODE: 7BEL6P1**

**CORE COURSE – XV- Embedded and Power Electronics Lab**

**(Any Fourteen Experiments)**

1. BCD to ASCII and ASCII to BCD.

2. Decimal to Hexa and Hexa to Decimal.

3. Interfacing with DIP switches and LED

4. Interfacing with Seven Segment LED

5. Interfacing with Traffic Light controller.

6. Interfacing with Stepper Motor

7. Interfacing with DC Motor speed control using PWM

8. Interfacing with HEX Keyboard

9. Interfacing with LCD

10. Interfacing with DAC

11. Generate wave forms using DAC

12. Interfacing with ADC.

13. Serial communication using RS232

14. Interfacing LM35

15. SCR Characteristics

16. TRIAC Characteristics

17. DIAC Characteristics

18. UJT Firing Circuit

19. Microcontroller Based Firing Circuit for Thyristor

20. Microcontroller Based Motor Drives.-Speed Control of DC Motor

♣♣♣♣♣♣♣♣♣♣

**III YEAR – VI SEMESTER**

**COURSE CODE: 7BELE3A**

**ELECTIVE COURSE -III (A) - BIOMEDICAL INSTRUMENTATION**

**Unit – I Clinical Laboratory Instruments**

Operations of the Clinical Laboratory – Chemical Electrodes – Blood Gas Analyzer – Blood Cell Counter – Radiation Detector – Computer in the Chemical Laboratory – Selection of a Computer System.

**Unit – II X- Ray Computer Tomography**

CT Scanners and Detectors – Image Processing for Computer Tomography – Spiral/Helical Computed Tomography – Clinical Applications of Computer Tomography

**Unit – III Nuclear Medical Imaging Systems**

Instrumentation the Gamma Camera – Image Characteristics – Clinical Application of Nuclear Medicine - Positron Emission Tomography – Radio Isotopes and Radio Pharmaceuticals – Radiation Dose.

**Unit – IV Magnetic Resonance Imaging**

Nuclear Magnetism – Vector Description of Magnetic Resonance – Signal Excitation and Detection – NMR Spectrum

**Unit – V Ultrasonic Imaging Systems**

Therapeutic Ultrasonic Equipment – Ultrasonic Imaging Equipment – Ultrasonic Blood Flow Meter – Applications of Ultrasound – Obstetrics and Gynecology – Breast Imaging – Cardiac Disease.

**Text / Reference Books:**

1. Text Book of Biomedical Instrumentation, K.N.Scott, CBS Publishers -2007
2. Hand Book of Biomedical Instrumentation, R.S.Khandpur, Tata McGraw Hill -2003.

♣♣♣♣♣♣♣♣♣♣

**III YEAR – VI SEMESTER**

**COURSE CODE: 7BELE3B**

**ELECTIVE COURSE - III (B) - INDUSTRIAL ELECTRONICS**

 **Unit – I Heating**

Induction Heating – High Frequency Power Source for Induction Heating – Application of Induction Heating – Dielectric Heating – Electrodes used in Dielectric Heating – Methods of Coupling of Electrodes of RF Generator – Thermal Losses in Dielectric Heating – Dielectric Heating Applications.

**Unit – II Relays And Timers**

The Relay – Basic Construction – Solid State Relays – RC charging and Discharging circuits – UJT/SCR Time Delay Relay – The 555 Timer as On-Delay Timer – Astable Multivibrator – Monostable Multivibrator Circuit of PWM with 555 – One Short Multivibrator – Synchronous Timer – Sequence Timer Employing 555.

**Unit – III Electronic Resistance Welding**

Resistance Welding and its Process – Basic Circuit for AC Resistance Welding – Types of Resistance Welding – Steps in Resistance Welding Process – AC Operated Weld Control – Sequence Timer Weld Control Circuit.

**Unit – IV Photoelectric Circuit**

Photo Electric Devices LDR – Photodiode – Photo Transistor – Photo Multiplier – Automatic Counting Moving Object – Automatic Street Light Controller – Burglar Alarm – Fire Alarm.

 **Unit – V Ultrasonics**

Ultrasonic Generation and Detection – Ultrasonic Application in Welding and Clearing – Ultrasonic Application in Medicine – Blood Flow Meter – Ultrasonic Scanning – Ultrasonic Flaw Detector in Industry.

**Text Books:**

1. Industrial Electronics. G.K. Mithal. Khanna Publications
2. Industrial Electronics, S.N.Biswas, Dhanpat Rai and Co. Ltd.-2000
3. Industrial Electronics and Control, S.K.Bhattacharya, Tata McGraw Hill-2002

♣♣♣♣♣♣♣♣♣♣

**III YEAR – VI SEMESTER**

**COURSE CODE: 7BELE3PR**

**ELECTIVE COURSE III (C) - PROJECT**

 **Note: Project is one of the III Elective papers if the Students Select Project from III Elective provide 40\* marks for internal and 60\* marks for external**

♣♣♣♣♣♣♣♣♣♣