KUVEMPU UNIVERSITY

Subject : ELECTRONICS
Semester : I st
Title : Electrical components & Circuit theory

Paper : I st
No of hours : 60
No of hours per week : 4
Max marks:50

Unit 1: Passive Components & Network analysis: Resistors, Capacitors, Inductors: Specification, types, color Codes. Transformer: Specification, Types, working, features, transformation ratio, transformer losses.
Network analysis and theorems: Ideal voltage and current sources, KCL, KVL, mesh analysis, superposition theorem, thevenin' s theorem, norton' s theorem, Maximum power transfer theorem.

Unit 2: AC Transient Analysis: AC fundamentals, Definition of instantaneous, peak, peak to peak, root mean square and average values. voltage-current relationship in resistor, inductor and capacitor- Phasor, complex impedance. power in AC circuits: instantaneous power, average power, reactive power, power factor. Sinusoidal circuit analysis for RL, RC and RLC series circuits. Resonance in series and parallel RLC circuits, frequency response of series and parallel RLC circuits.

Unit 3: DC Transient Analysis : Study the charging & discharging of capacitor through resistor- Expression for instantaneous voltage across the capacitor, Growth & Decay of current in series RL circuit, Energy stored in Inductor & capacitor. RC Integrator & Differentiator circuit.
Frequency filter: low pass, high pass, band pass and band stop.

Unit 4: Measuring Instruments & Sensors: Description of physical parameters, measurement system block diagram. Measurement characteristics, accuracy, precision, sensitivity, linearity, resolution. Comparison of Analog & digital meters (DMM).
CRO: Principle, construction, working, application & advantages.
Sensors: need, definition, types, classification, principle, input/output Parameters, construction, working & specification of thermal, electrical & mechanical sensors.

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Subject : ELECTRONICS PRACTICAL
Semester : I st
Title : Electrical Lab

Paper : I st
No of hours per week : 3
Max marks: 40

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1. Verification of Superposition theorem
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Verification of Maximum power transfer theorem.
5. Impedance in series RC circuits
6. Impedance in parallel RC circuits
7. Phase measurement using CRO
8. Series LRC circuits :
9. Parallel LRC circuits determination of frequency of AC mains.
10. Voltage during Charging & discharging of a Capacitor
11. Current flow during Charging & discharging of a Capacitor
12. Energy stored during charging of a Capacitor.

Reference Books:

1. Applied Electronics- R.S.Sedha- S Chand &Co
2. Principles of Electronics- V.K. Mehta and Rohit Mehta - S Chand & Co
3. Basic Electronics- B.L.Theraja - S Chand & Co
4. Electronic Principles – Malvino
5. Electronic Devices & Circuits -Sanjeev Gupta
6. Basic electronics and linear circuits - N.N. Bhargava, D.C.Kulsheshtha and S.C.Gupta - Tata McGraw Hill - 1987.

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Subject : **ELECTRONICS**
Semester : **2 nd** **Paper** : **2 nd**
Title : **Semi conductor devices & its Applications** **No of hours : 60**
No of hours per week : 4
Max marks: 50

Unit 1: Semiconductor Basics : Structure of solids - Conductivity of solids, energy bands, bonding in solids. semi conductors - types of semiconductors - P & N Type, charge carriers, charge concentration, Fermi level, temperature dependence of carrier concentration, mobility, conductivity, energy gap, drift and diffusion current. pn junction diode zener diode, tunnel diode- construction, working & Characteristics.

Unit 2: Rectifier & filter, power supply: Theory of Half wave & Full wave rectifier, expression for the efficiency, ripple factor. Comparison among the rectifiers. Ripple Filters- Types, construction & working of different types. Power Supply: Voltage regulator using Zener diode, Clippers & clampers : Types, construction & working.

Unit 3: Bipolar Junction Transistors: Types, construction, working, different configuration, Characteristics of transistor in CE mode, parameter of transistor & their relations. FETs: Types, construction, working & characteristics.

Unit 4: Amplification action of Transistor: Introduction to amplifier, Need for biasing, types Transistor biasing- Dc load line, factors affecting the operating point, stability analysis, description of CE amplifier, AC load line. Analysis of CE amplifier – graphical analysis & approximate model analysis. Emitter follower & Darlington pairs - circuit operation & application.

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Subject : ELECTRONICS PRACTICAL
Semester : 2 nd
Title : Analog Electronics lab1

Paper : 2 nd
No of hours per week : 3
Max marks: 40

1. PN diode characteristics
2. Zener diode characteristics
3. Half & center tapped full wave rectifier
4. Bridge rectifier
5. Zener as voltage regulator
6. Clippers & Clampers.
7. Transistor Characteristics
8. Transistor CE Amplifier
9. DC load Line.
10. Emitter follower.
11. FET Characteristics
12. MOS FET Characteristics

Reference Books:

1. Applied Electronics- R.S.Sedha- S Chand &Co
2. Principles of Electronics- V.K. Mehta and Rohit Mehta - S Chand & Co
3. Basic Electronics- B.L.Theraja - S Chand & Co
4. Electronic devices and circuits - G.J.Mithal, Khana publishers, New Delhi
5. A Text Book of Applied Electronics - R.S. Sedha, S. Chand & Co.
6. Electronic Principles – Malvino
7. Electronic Devices & Circuits -Sanjeev Gupta
8. Basic electronics and linear circuits - N.N. Bhargava, D.C.Kulsheshtha and S.C.Gupta - Tata McGraw Hill - 1987.

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Subject : **ELECTRONICS**
Semester : 3 rd
Title : **Opto Electronics devices, Amplifier & power electronics.**

Paper : 3 rd
No of hours : 60
No of hours per week : 4
Max marks: 50

Unit 1 : Opto Electronics devices: Photo Electric effect & Laws, conductivity, Photo emissive, photo voltaic cells, Photo-diode, Photo-transistor, Photo detector, LED, LCD, LDR, Opto-coupler, Photo multiplier & solar cell: construction, characteristic and applications.

Unit 2 : Amplifiers: Power Amplifier: classification, performance quantifies of power amplifier, circuit operation of different type, expression of efficiency comparison, Application.

Tuned Amplifier: Types, circuit Operation, Frequency response, application.

Feed back Amplifier: Concept of feedback, different feed back techniques, expression for transfer gain, loop gain. comparison between the types.

Multistage Amplifier: Need, Methods of coupling- circuit analysis, Frequency response, Application.

Unit 3 : Oscillators: Oscillators : Barkhausen criteria for sustained oscillation, derivation of general condition for oscillation, classification- circuit operation, expression for frequency of oscillation, comparisons, applications.

Multivibrators: Types, circuit operation, expression for frequency, comparisons & applications.

Unit 4 : Power electronics: UJT, SCR, Diac, Triac : construction, operation, Applications.

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Subject : ELECTRONICS PRACTICAL
Semester : 3 rd
Paper : 3 rd
Title : Analog Electronics lab 2
No of hours per week : 3
Max marks: 40

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1. Opto-electronic Devices – Photo diode, photo transistor, LDR Characteristics.
2. Opto-electronic Devices – LED, Opto-coupler Characteristics.
3. RC coupled Amplifier.
4. Class A Audio power Amplifier.
5. Tuned Amplifier.
6. Feed back Amplifier.
7. Collpitts / Hartely Oscillator.
8. RC phase shift Oscillator.
9. Wein Bridge Oscillator.
10. Astable Multivibrator
11. UJT Characteristics
12. SCR Characteristics

Reference Books:

1. Applied Electronics- R.S.Sedha- S Chand &Co
2. Principles of Electronics- V.K. Mehta and Rohit Mehta - S Chand & Co
3. Basic Electronics- B.L.Theraja - S Chand & Co
4. Electronic devices and circuits - G.J.Mithal, Khana publishers, New Delhi
5. A Text Book of Applied Electronics - R.S. Sedha, S. Chand & Co.
6. Power Electronics –By M.D. Singh and K.B. Khanchandani, TMH Pub.Co.Ltd.
7. Thyristors Theory and Applications (Second edition)-R.K. Sugandhi and K.K.Sugandhi Wiley Eastern Ltd.

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Subject : ELECTRONICS
Semester : 4 th
Title : Differential amplifier& Liner ICs

Paper : 4 th
No of hours : 60
No of hours per week : 4
Max marks: 50

Unit 1 : **Differential amplifier & OPAMP**: Differential amplifier: Introduction, different configuration, detailed discussion of dual input Balanced output differential amplifier- Expression for output voltage, transfer characteristic-using DC and AC equivalent circuits, differential and common mode operation, CMRR.

OPAMP: Introduction, block diagram, symbol, characteristics of an ideal opamp. Parameters of OPAMP, Inverting & non inverting amplifier with feedback-expression for closed loop voltage gain, voltage follower circuit.

Unit 2: **OPAMP Applications**: Current to voltage converter, Inverter/phase changer, differential amplifier, Adder, subtractor, Multiplier, integrator, Differentiator: circuit operation, derivation.

Frequency filters using op amp: Low pass, High pass, Band pass, Band stop, All pass filters: circuit operation, derivation for cutoff frequency.

Unit 3: **Comparator, signal generator & voltage regulator:** Basic comparator, Characteristics, comparator, zero crossing detectors, circuits Operation using OPAMP, Application.

Introduction to Timer (555): Block diagram, Monostable, Astable Multivibrator, Schmitt trigger, Voltage to frequency, and frequency to voltage converter.

Basic circuit configuration and characteristics of voltage regulators: Basic blocks of linear voltage regulator- three terminals fixed regulators (78XX and 79XX), variable voltage Regulators (723), typical circuits & Applications.

Unit 4 : **IC Fabrication & VLSI:** Introduction, classification of ICs, scale of Integration, Advantages & disadvantages over discrete components.

Thick & Thin film technology: Features, Advantages and applications. Monolithic IC process, fabrication of resistors, capacitors, diodes, Transistor. VLSI: Introduction to VLSI Systems, evolution of VLSI, design hierarchy, CMOS fabrication technology and design rules.

Subject : ELECTRONICS PRACTICAL
Semester : 4 th
Title : Linear IC lab

Paper : 4 th
No of hours per week : 3
Max marks : 40

1. Differential Amplifier using transistor.
2. Determination of OPAMP parameters.
3. Determine the Slew rate & CMRR of practical OPAMP.
4. OPAMP as Inverting & Non-inverting amplifier
5. OPAMP as differential amplifier
6. OPAMP as adder & subtractor
7. OPAMP as Integrator & Differentiator.
8. OPAMP as voltage to current & current to voltage converter.
9. OPAMP as Low pass filter High pass filter
10. OPAMP as Band pass filter
11. OPAMP as Band stop filter
12. OPAMP's frequency response.

Reference Books:

1. Op-Amps and Linear IC' s - R.A. Gayakwad, , Pearson Education (2003)
2. Basic Electronics- B.L.Theraja - S Chand & Co
3. Electronic devices and circuits - G.J.Mithal, Khana publishers, New Delhi
4. Integrated Circuits - Deboo and Burrous - McGraw Hill.
5. Linear ICs - D. Roy Choudhury, Sherif, Jain - Wiley Eastern.
6. Integrated Circuits - K.R. Botkar - Khanna Publishers.

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Subject : ELECTRONICS
Semester : 5 th
Title : Digital Electronics

Paper : 5 th
No of hours : 45
No of hours per week : 3
Max marks: 50

Unit 1: **Number system, Logic gates, Logic design**: Number system-types, inter conversion, 1's and 2's complement. Information codes. Logic System: Boolean algebra, proof of Boolean identities using Boolean Laws. De Morgan's theorems. Logic Gates:- Basic gates, universal gates, X-OR gates, X-NOR gates. Combinational logic design, min term and max term, SOP and POS, inter conversion. simplifying the Boolean expressions using Boolean Laws & K-Map, Quine McClusky method.

Unit 2: **Combinational logic circuit**: Adders, subtractor, encoder, decoder, multiplexer, de multiplexer, parity generator & checker- design concept, & circuit implementation using gates.

Unit 3: **Sequential circuit**: flip flop: latch, RS flip flop, JK flip flop, D flip flop, T flip flop, master slave flip flop- working & application.
Counter: Ripple counters- Design of 4 bit asynchronous counter, decade counter & up-down counter – working with timing diagram. Synchronous counter transition table for J-K Flip-Flop and designing of 3 bit synchronous counter. Comparison of ripple and synchronous counter, Ring counter, Jonhson counter.
Shift register: Types of shift registers, working & application.

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Subject : ELECTRONICS PRACTICAL
Semester : 5 th
Title : Digital lab

Paper : 5 th
No of hours per week : 3
Max marks : 40

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1. Basic gates using discrete component
2. Realization of AND, OR, NOT, NOR, XOR, XNOR using IC 7400
3. Realization of Half / Full adder using basic and universal gates.
4. Realization of Half / Full subtractor using basic and universal gates.
5. Parallel adder using IC 7483
6. Encoder and Decoder using IC 74147 and IC 7447 respectively
7. Truth table verification of all flip flop
8. Realization of Multiplexer/ De-Multiplexer using logic gates and appropriate IC
9. Synchronous mode using IC 7476, IC7490 & IC 74193
10. Ring counter
11. Realization of 4-bit Shift Register using IC 7474 , IC 7476 & IC 74175
12. Code converter

Reference Books:

1. Modern Digital Electronics - R.P. Jain, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. Digital Principles and Applications - A.P.Malvino & D.P.Leach, Tata McGraw Hill Publishing Co. Ltd.
3. Digital Fundamentals - T.L. Floyd, Pearson Education, 8/e.
4. Modern Digital electronics : R.P. Jain, TataMcGraw Hill 1997
5. Computer System Aaraachitecture, 2nd Edition, M. Marris mano, Prentice Hall.

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Subject : ELECTRONICS
Semester : 5 th
Title : Analog & digital communication

Paper : 6 th
No of hours : 45
No of hours per week : 3
Max marks : 50

Unit 1: Amplitude modulation : Radio communication: Elements of communication system, modes of propagation of radio waves, Need for modulation – types. Amplitude modulation- mathematical expression of AM wave, frequency spectrum, bandwidth, modulation index, modulation by several sine waves, power relations. Modulator – collector modulator with theory
SSB - theory of balanced modulator, suppression of side band by filter method. AM transmitter – block diagram. Demodulators- principle, qualities of good receiver, linear diode detector. AM broadcast receiver- principles, working, super heterodyne receiver. IF- factors governing choice of IF, image frequency and image frequency rejection.

Unit 2 : Frequency modulation: mathematical representation of FM wave, Frequency spectrum, band width considerations, generation of FM - theory of basic reactance modulator , FM transmitter – block diagram. FM demodulation – principle, balanced slope detector – Foster Seeley discriminator.
Pre-emphasis and De-emphasis, Block diagram of FM receiver and its working. comparison of AM and FM

Unit 3 : Digital communication: Pulse modulation systems: Sampling theorem, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, - theory, generation & comparison.
Digital Carrier Modulation Techniques: Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying (PSK).
Multiplexing: Frequency Division Multiplexing, Time Division multiplexing: theory, generation & comparison.

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Subject : ELECTRONICS PRACTICAL
Semester : 5 th
Title : Communication lab

Paper : 6 th
No of hours per week : 3
Max marks : 40

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1. Amplitude modulator and demodulator using transistor
2. IF amplifier
3. Class – C tuned amplifier.
4. Pre-emphasis and De-emphasis circuits using OPAMP.
5. Frequency mixer.
6. Astable multivibrator using IC 555
7. Mono stable multivibrator using IC 555
8. Schmitt trigger using IC 555
9. Phase shifter using IC 741
10. variable voltage regulator using IC 723
11. Saw tooth generator
12. triangular wave generator

Reference Books:

1. Electronic Communication Systems - George Kennedy, McGraw Hill Book Company,
2. Communication System - Roddy & Coolen, 4/e, Pearson Education, 2005.
3. Principles of Communication Engineering - Anok Singh, Sathyaprakasam Publications, 2004.
4. Electronic Communications – Sanjeev Gupta – Khanna Publications

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Subject : ELECTRONICS
Semester : 6th
Title : Micro controller & Application

Paper : 7 th
No of hours : 45
No of hours per week : 3
Max marks : 50

Unit 1: **Microcontroller architecture**; comparison between microprocessor and Microcontrollers, 8051 Microcontroller, architecture, 8051 oscillator and clocks, program counter and data pointer, registers, flags, PSW. internal memory, internal RAM & external memory. stack , special function registers. I/O pins, ports.

Unit 2: **Instruction set & Programming:** Introduction - addressing modes, byte level logical operations, bit level logical operations, rotate and swap operation simple programs.

Arithmetic operations : Introduction, incrementing and decrementing, addition, subtraction, multiplication, division - simple programs.

Instruction Set : introduction, external data move, push & pop, opcodes, Data exchanges - simple programs.

Jump and Call Instruction: Introduction, jump and call program.

Unit 3: **Timer / counter, interrupts, & interfacing**: counter / timer interrupts, timing timer modes of operation, counting.

Serial data input / Output: serial data interrupt, data transmission, data reception, serial data transmission modes.

Interrupts: timer flag interrupt, serial port interrupt, external interrupt reset, interrupt control , interrupt priority, interrupt destination.

Interfacing: iescription of 8255, interfacing 8051 to LED, seven segment & DAC.

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Subject : ELECTRONICS PRACTICAL
Semester : 6 th
Title : Micro controller application lab

Paper : 7 th
No of hours per week : 3
Max marks : 40

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1. Data transfer: exchange, block move.
2. Arithmetic operation: Addition, subtraction
3. Arithmetic operation: Multiplication
4. Arithmetic operation: division
5. 1's and 2's complement of 8 bit number/16 bit numbers.
6. Two programs on logical operations.
7. Program to convert Binary number to equivalent Gray number.
8. Program to unpack the packed BCD number.
9. Smallest of two numbers
10. Largest of two numbers
11. Interfacing of LCD
12. Interfacing the DAC

Reference Books:

1. Kenneth. J. Ayala, "The 8051 Microcontroller Architecture, Programming and Application" II Edition.
2. Mohammed Ali Maszidi, "The 8051 Microcontroller and Embedded - system"
3. 8051 Microcontroller: Hardware, Software and Applications- V. Udayshankara, M. S. Mulikarjun Swami-McGraw Hill.
4. Microprocessor, microcontroller & applications- U. S. Shah (Tech-Max Pune).
5. Microcontroller (Theory and Applications) - Ajay V. Deshmukh- McGraw Hill.
6. Microcontroller & Applications-A. P. Godse, Technical Publications, Pune

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Subject : ELECTRONICS
Semester : 6th
Title : Advanced communication system

Paper : 8th
No of hours : 45
No of hours per week : 3
Max marks : 50

Unit 1: Television: Requirements of TV system. Block diagram of monochrome T.V transmitter and receiver. Scanning Techniques: progressive scanning and interlaced scanning. Composite Video Signal. calculation of video bandwidth, vestigial side band transmission. Camera tube: principle, construction and working of Image orthicon & Vidicon Camera Tube. Construction and working of monochrome picture tube. Basics of colour TV

Unit 2 : Micro wave, Radar : Introduction – Frequency spectrum, Micro wave bands, Applications of microwaves in different fields. Guided waves, wave guides- Introduction, rectangular wave guides, TE and TM waves, Transverse electromagnetic waves. Microwave Semiconductor devices – Schottky diodes, Point contact diodes, Varactor diodes, IMPATTT, TRAPATT, Gunn diode, Applications.

Radar: Radar: Radar Equation, Radar Block Diagram and Operation, Radar Equation, Radar Frequencies, Applications of Radar, The Origins of Radar Prediction of Range, Minimum Detectable Signal, Receiver Noise, Radar altimeters. Types of Radar: CW radar, MTI and Pulse Doppler Radar: Introduction, working, Applications & limitations. Display units: A-Scope & Plane Position indicator.

Unit 3 : Satellite & Mobile communications: Need for Artificial satellite, types Satellite launching Vehicle & satellite, applications.

Geo-Synchronous Satellite: expression for orbital velocity, Transponders, uplink and downlink frequency, Block diagram of satellite electronic system and earth station.

Mobile Communication: Introduction to Cellular Mobile Systems- Mobility, need, advantages and limitations. A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, overview of generations of cellular

systems. Elements of Cellular Radio Systems Design and Interference- General description of the problem, Cellular Concept: cellular system Architecture- cells, clusters, frequency reuse channels, channel assignment, hand off, co-channel interference reduction factor, cell splitting, consideration of the components of cellular systems.

Reference Books:

1. Monochrome and Colour Television – R.R. Gulati, 1/e, New Age International Publishers.
2. Electronic Communication Systems – George Kennedy, McGraw Hill Book Company,
3. Communication System – Roddy & Coolen, 4/e, Pearson Education, 2005.
4. Principles of Communication Engineering – Anok Singh, Sathyaprakasam Publications, 2004.
5. Microwave Engineering-Sanjeeva and Gupta
6. Optical Fibers and Fiber Optic Communication Systems, S.K. Sarkar, S.Chand and Company Ltd., New Delhi.
7. Communication Engineering, J.S. Katre, Technova Educational Publications, Pune.
8. Mobile Cellular Telecommunication – William CY Lee – TMH – II Edition.

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Subject : ELECTRONICS PRACTICAL
Semester : 6 th
Title : Project

Paper : 8 th
No of hours per week : 3
Max marks : 40

- Useful projects should be produced.
- Projects must include electronic hardware and the demonstration is compulsory. Project work shall be completed batch wise.
- The batch shall consist a maximum of 4 candidates.
- Project Viva-Voce examination shall be conducted batch wise.

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BACHELOR OF SCIENCE
DEGREE COURSE
B.Sc. ELECTRONICS
(With effect from 2013-2014)

The Course of Study and the Scheme of Examinations

Sem	Paper	Title of the paper	Ins Hrs/ week	Exam hrs	IA	Uni Exam	Total
I	I	Electrical components & Circuit theory	4	3	10	50	100
	I	Electrical Lab	3	3	-	40	
II	II	Semi conductor devices & its Applications	4	3	10	50	100
	II	Analog Electronics lab1	3	3	-	40	
III	III	Opto Electronics devices, Amplifier & power Electronics	4	3	10	50	100
	III	Analog Electronics lab1	3	3	-	40	
IV	IV	Differential amplifier& Liner ICs	4	3	10	50	100
	IV	Linear IC lab	3	3	-	40	
V	V	Digital Electronics	3	3	10	50	100
	V	Digital lab	4	3	-	40	
	VI	Analog & digital Communication	3	3	10	50	100
	VI	Communication lab	3	3	-	40	
VI	VII	Micro controller & its Application	3	3	10	50	100
	VII	Micro controller Application Lab	3	3	-	40	
	VIII	Advanced communication system	3	3	10	50	100
	VIII	Project	3	3	-	40	

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Practical: Scheme of valuation

Max marks: 40

Sl.No	Particular	Marks allotted
01	Writing the circuit diagram with relevant marking	03
02	Description about the experiment	03
03	Writing the Neat tabular column, ideal graph (if any)	03
04	Formulas & explanation of each terms with their units	02
05	Handling the instruments & connection	04
06	Observation, trials	08
07	Calculation	05
08	Accuracy & neatness	02
09	Viva	05
10	Record	05

Section	Types	Question to be given	Question to be Answered	Marks for each question	Total marks	Unit 1	Unit 2	Unit 3	Unit 4
A	Objective type	5	4	1	4	1	1	1	1
B	Short answer questions	5	4	2	8	1	1	1	1
C	Medium answer questions	5	4	4	16	1	1	1	1
D	Long answer questions	5	4	6	24	1	1	1	1
Total Marks				50	50	12	12	12	12

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CURRICULUM IN ZOOLOGY FOR B.Sc. (UG)

B.Sc. DEGREE SEMESTER SYLLABUS (Effective from 2018-19 onwards)

	Theory				Practical		
Year	Sem	Paper	Title	Teaching Hrs	Paper	Title	Teaching Hrs
I	1	1	Diversity and Functional Anatomy of Non-Chordates	60 hrs	1	Diversity and Functional Anatomy of Non-Chordates	15 x3 = 45hrs
	2	2	Diversity and Functional Anatomy of Chordates	60 hrs	2	Diversity and Functional Anatomy of Chordates	15 x3 = 45hrs
II	3	3	Ecology, Ethology and Biodiversity	60 hrs	3	Ecology, Ethology and Biodiversity	15 x3 = 45hrs
	4	4	Animal Physiology, Biochemistry and Biostatistics	60 hrs	4	Animal Physiology, Biochemistry and Biostatistics	15 x3 = 45hrs
III	5	5.1	Cell Biology, Microbiology and Immunology	45 hrs	5	Cell Biology, Microbiology and Immunology	15 x3 = 45hrs
		5.2	Applied Zoology, Histology and Bio-techniques	45 hrs	6	Applied Zoology, Histology and Bio-techniques	15 x3 = 45hrs
	6	6.1	Genetics, Molecular Biology and Evolution	45 hrs	7	Genetics, Molecular Biology and Evolution	15 x3 = 45hrs
		6.2	Developmental Biology and Animal Biotechnology	45 hrs	8	Developmental Biology and Animal Biotechnology	15 x3 = 45hrs

Teaching hours: I & II year 4 hours theory and 3 hrs Practical / week. III year 3+3=6 hrs theory and 3+3=6 hours Practical / week.

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