

Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING & EXAMINATION

B.E. VII Semester Bio Medical Engineering

S.No.	Board of Study	Subject Code	Subject	Periods per week			Scheme of Exam			Total Marks	Credit L+ (T+P) / 2
				L	T	P	Theory/ Practical				
							ESE	CT	TA		
1	Bio Medical Engg.	317711 (28)	Microcontroller Based Medical Instruments	3	1	-	80	20	20	120	4
2	Bio Medical Engg.	317712(17)	Bio Informatics	3	1	-	80	20	20	120	4
3	Electronics & Telecom.	317713 (28)	Digital Communication System	3	1	-	80	20	20	120	4
4	Bio Medical Engg.	317714 (17)	Hospital Management	4	-	-	80	20	20	120	4
5	Refer Table - II		Elective II	4	1	-	80	20	20	120	5
6	Bio Medical Engg.	317721 (17)	Bio Informatics Lab	-	-	4	40	-	20	60	2
7	Electronics & Telecom.	317722 (28)	Digital Communication System Lab	-	-	3	40	-	20	60	2
8	Bio Medical Engg.	317723 (17)	Microcontroller Based Medical Instruments Lab	-	-	3	40	-	20	60	2
9	Bio Medical Engg.	317724 (17)	Minor Project	-	-	6	100	-	40	140	3
10	Management	300725 (36)	Innovative & Entrepreneurial Skills	-	-	2	-	-	40	40	1
11	Bio Medical Engg.	317726 (17)	** Practical Training Evaluation and Library	-	-	1	-	-	40	40	1
Total no. of periods 40				17	4	19	620	100	280	1000	32

L- Lecture T- Tutorial P- Practical , ESE- End Semester Exam CT- Class Test TA- Teacher's Assessment

** To be completed after VI Sem. and before the commencement of VII Sem .

Table -II			
Professional Elective -II			
S.No.	Board of Study	Subject Code	Subject
1	Bio Medical Engg.	317731(17)	Artificial Intelligence
2	Bio Medical Engg.	317732(17)	Rehabilitation Engineering
3	Biotech Engg.	317733(18)	Drug Delivery System

Note (1)- 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a particular academic session.

Note (2) - Choice of elective course once made for an examination cannot be changed in future examinations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Microcontroller Based Medical Instruments
Total Theory Periods: 40
Total Marks in End Semester Exam: 80
Minimum number of class test to be conducted: 2

Branch: Bio Medical Engg.
Code: 317711 (17)
Total Tut Periods: 12

MODULE 1

Microcontroller Concepts: Technical view, Micro Controller system, Micro Controller Unit, CPU, Memory Concepts, Memory Map.

Software: Source code , object code and assembler, using high level language, Fetch and Execute operation of CPU, Instruction set, addressing modes, Basic operation, Microcontroller Arithmetic and condition code register, program flow control using looping and branching.

MODULE 2

Stack Subroutine Interrupts and, Modular Programming Using subroutines, Subroutine operation. Concepts of interrupts, Interrupts vectors, interrupts operation, Hardware interrupts and reset, software and CPU controlled interrupts.

MODULE 3

Hardware: Bus, Tri state, Address Encoding, Different modes of operation, Different memory technology (RAM, EPROM, FLASH, CONFIG, INIT).

Serial Sub Systems : Asynchronous Communication system, Serial communication interface, SPI Topologies and application, SPI software and error handling.

MODULE 4

Interfacing: Transducers, D-A converter, A-D converter, built in AD system, Input and Output systems and Registers, Memory and I.O. Mapping, Interfacing using polling interrupts, Different subsystems, LCD and keyboard interfacing

MODULE 5

Interfacing Temperature Sensors, Interfacing flow sensors, Interfacing optical Sensors. Eight Bit Microcontroller Families: Motorola families, Intel 8051 core, Survey of other Families, Choosing a Microcontroller.

Suggested Books and References:

- ✍✍Peter Spasov-Microcontroller Technology the 68 Hell Prentice Hall.
- ✍✍G.J. Lipovsk-Single & Multiple Chip Microcomputer Interfacing-Prentice Hall.
- ✍✍MOTOROLA- Understanding small Microcontrollers MOTOROLA.
- ✍✍Willis J. Tompkins & Webster- Interfacing Sensors to PC Prentice Hall.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Bio Informatics
Total Theory Periods: 40
Total Marks in End Semester Exam: 80
Minimum number of class test to be conducted: 2

Branch: Bio Medical
Code: 317712 (17)
Total Tut Periods: 12

MODULE : 1

Introduction to Bioinformatics. Data bank:Protein and Nucleic acid; data bank for different organisms.Use of databases in biology sequence databases, structural databases.

MODULE : 2

Sequence Analysis - protein and nucleic acids, Analysis tools for sequences Data Bank; Pair wise and Multiple sequence alignment; secondary structure predictions; Fold recognition.

MODULE : 3

Structural comparisons, FASTA-BLAST-Amino acid substitution matrices PAM and BLOSSUM. genome projects, Biological Information-Database location and organization; access to database;software; database searching; locating specific entries; identity searches; similarity searches.

MODULE : 4

Information theory and biology: Entropy, Shannon's formula, divergences from equiprobability and independence, Markov chains, ergodic processes, redundancy, application to DNA and protein sequences.

MODULE : 5

DNA Mapping and sequencing-Map alignment-Large scale sequencing and alignment-Shotgun-DNA sequencing-Sequence assembly-Gene predictions-Molecular predictions with DNA strings.

Text/Reference Books:

1. Molecular databases for protein sequence and structure studies by Sillince, JA and Sillince M (1991) springer Verlag.
2. Sequence Analysis primer by M. Gribskov, J. Devereux (1989) Stockton Press.
3. Computational Methods in Mol.Biol./Now Comprehensive Biochemistry Vol.32. S.L.Seizberg, DB Searls, S.Kasif Elsevier 1998.
4. Computer methods for macromolecular analysis. Methods in Enzymology. Vol.266 by R.F.Doolittle. Academic Press 1996.
5. Information theory and living systems by L.I. Garfield, (1992) Columbia University Press.
6. Dan Gusfield, " Algorithms on Strings Trees and Sequneces ", Cambridge University Press, 1997.
7. P.Baldi,S Brunak, Bioinformatics; " A Machine Learning Approach ", MIT Press, 1998.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Digital Communication System
Total Theory Periods: 40
Total Marks in End Semester Exam: 80
Minimum number of class test to be conducted: 2

Branch: Bio Medical Engg.
Code: 317713 (28)
Total Tut Periods: 12

MODULE : 1

Introduction

A historical perspective in the development of digital communication. Elements of digital communication system. PAM, PPM AND PWM.

Pulse code modulation, quantization noise, linear and non-linear quantization, companding. Differential pulse code modulation, delta modulation, adaptive delta modulation, Delta sigma modulation, linear predictive coders.

MODULE : 2

Digital modulation techniques

BPSK, DPSK, BFSK, MARY-PSK & -FSK, QPSK, MSK principles, QASK, Error calculation of all techniques.

MODULE : 3

Base band signal receiver: integrate and dump type filter probability of error calculations, optimum filters, coherent reception, matched filter and its transfer function. Probability of error of matched filter.

MODULE : 4

Information theory & Coding

Concept and measure of information, Entropy, Discrete and continuous messages, Message source, zero memory source, extension of zero memory source, Markov source and their entropy, Channel with and without memory, Channel capacity, Hartley and Shannon's law. Hoffman and Shannon - Fano coding.

MODULE : 5

Radio wave propagation:

Electromagnetic waves, properties of radio waves, Propagation of waves, Propagation terms and definitions.

Multiplexing: Frequency Division, Time Division Multiplexing & Code-Division Multiplexing.

Suggested Books & References:

Title	Writer	Publication
<i>Electronics Comm. System</i>	Wayne Tomasi,	Pearson Education
<i>Electronics Comm. System</i>	Roy Blake	Thomson Asia Pte. Ltd.
<i>Principles of Comm. System</i>	Taub & Schilling	Pearson Education
<i>Communication System</i>	Singh & Shapre	Tata McGraw Hill

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Hospital Management
Total Theory Periods: 50
Total Marks in End Semester Exam: 80
Minimum number of class test to be conducted: 2

Branch: Bio Medical
Code: 317714 (17)
Total Tut Periods: NIL

MODULE-1

Overview of database system, Database system technology, Entities, Attributes and Keys, Relationships, Functionality, Entry Relation Diagram, Need for Database, Advantages, Database system Architecture. Relation model, hierarchical model, Network model.

MODULE -2

RELATION DATA STRUCTURE

Relation domains and Attributes, keys, Extension and Intensions. RDBMS Architecture, component relation data system. Introduction to SQL, DDL, Base table, Segments, fields, indexing

MODULE-3

DATA MANIPULATION

Different retrieval operations, using unions, built in function, functions in select clause with and without a predicate, function in sub query, UPDATE, INSERT, DELETE, Single and multiple record update, Single and multiple record insertion, Single and multiple record deletion, dictionary.

MODULE-4

Introduction, VIEWS, DML, operations with VIEWS, VIEWS and data independence, growth, restructuring summary. Functional Dependencies, Normal forms: First Normal Form, Second Normal Form, Third Normal Form, BCNF, Multi Level Functional Dependencies, Fourth Normal Form, DKNF Data Warehousing,

MODULE-5

HOSPITAL INFORMATION SYSTEM

Functional capabilities of computersied hospital, Need for computerization, Security of computer records, cost effective information processing, Source of data and decision making, models of desistion output of physician, Patient database management, computerised medical record evaluation, Database approach of laboratory of computerization, case study of hospital DBMS.

Suggested Books and Reference

1. C. J. Date, An Introduction to DBS
2. Jeffery. D. Ullman , Principle of DBS
3. R.D. Lele, Computers in medicine

For all Laboratories :
Lab work based on course content as per syllabi.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Artificial intelligence
Total Theory Periods: 50
Total Marks in End Semester Exam: 80
Minimum number of class test to be conducted: 2

Branch: Bio Medical
Code: 317731 (17)
Total Tut Periods: 12

MODULE 1

Introduction to Artificial Intelligence: Definition. A.I Applications, A I representation. Properties of internal Representation, General problem solving, production system, control strategies: forward and backward chaining.

MODULE 2

Heuristic search techniques. Depth First Search, Breadth First Search, Best first search, mean and end analysis, A* and AO* Algorithm.

MODULE 3.

Knowledge representation using predicate logic: predicate calculus, Predicate and arguments, resolution and unification Semantic, Frame System, Scripts, conceptual Dependency

MODULE 4

Knowledge representation using non-monotonic logic: TMS (Truth maintenance system), statistical and probabilistic reasoning, fuzzy logic, structure knowledge representation.

MODULE 5.

Introduction to Artificial Neural Network, supervised and unsupervised learning, pattern recognition problems, perceptron, Back propagation network, Application of neural network

Reference Books

1. Eugene, Charniak, Drew Mcdermott: Introduction to artificial intelligence.
2. Elaine Rich and Kerin Knight: Artificial Intelligence.
3. Kishen Mehrotra, Sanjay Rawika, K Mohan; Artificial Neural Neetwork.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Rehabilitation Engineering
Total Theory Periods: 50
Total Marks in End Semester Exam: 80
Minimum number of class test to be conducted: 2

Branch: Bio Medical
Code: 317732 (17)
Total Tut Periods: 12

Module-I

Engineering concepts in rehabilitation Engineering.

Anthropometry: Methods for Static and dynamic Measurements: Area Measurements, Measurement of characteristics and movement, Measurement of Muscular Strength and Capabilities.

Measurement tools and processes in Rehabilitation engineering: fundamental principles, structure, function; performance and behaviour. Subjective and objective measurement methods.

Module-II

Ergonomic aspects in designating devices: Introduction to Models in Process Control, Design of Information Devices, Traditional Devices, V.D.U' s, Using colour, Design of Controls

Module -III

Engineering concepts in sensory rehabilitation Engineering.

Sensory augmentation and substitution:

Visual system: Visual augmentation, Tactual vision substitution, and Auditory vision substitution.

Auditory system: Auditory augmentation, Audiometer, *Hearing aids*, cochlear implantation, visual auditory substitution, tactual auditory substitution,

Tactual system: Tactual augmentation, Tactual substitution,

Module - IV

Orthopedic Prosthetics and Orthotics in rehabilitation:

Engineering concepts in motor rehabilitation, applications. Computer Aided Engineering in Customized Component Design. Intelligent prosthetic knee. A hierarchically controlled prosthetic hand. A self-aligning orthotic knee joint. Externally powered and controlled Orthotics and Prosthetics.

FES systems-Restoration of hand function, restoration of standing and walking, Hybrid Assistive Systems (HAS).

Module - V

Computer applications in Rehabilitation engineering: Interfaces in compensation for visual perception. Improvement of orientation and mobility, Computer assisted lip reading, Brain computer interface.

TEXTBOOK

1. Bronzino, Joseph; Handbook of biomedical engineering. 2nd edition, CRC Press, 2000.

REFERENCE:

1. Horia- Nocholai Teodorecu, L.C.Jain , intelligent systems and technologies in rehabilitation engineering; CRC; December 2000.

2. Robinson C.J Rehabilitation engineering. CRC press 1995

3. Etienne Grandjean, Harold Oldroyd, Fitting the task to the man, Taylor & Francis, 1988.

Principles of deadlock – deadlock prevention, detection and avoidance dining philosophers problem – example Systems.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Drug Delivery System
Total Theory Periods: 50
Total Marks in End Semester Exam: 80
Minimum number of class test to be conducted: 2

Branch: Bio Medical
Code: 317733 (17)
Total Tut Periods: 12

Module 1

Minimum number of class test to conducted: Two Physicochemical Properties of drugs: activity of drug solutions; Osmotic properties of drug solutions; ionization of drugs in solution.

Drug Stability: the chemical decomposition of drug; kinetics of decomposition in solution; decomposition in the solid phase; factors affecting drug stability.

Module 2

Drug solubility: factors affecting drug solubility; solubility products; partitioning.

Surface and interfacial behavior: surfaces and surfactant; surface activity of drug; insoluble mono layer; adsorption isotherms; applications of adsorption in pharmaceutical science; micellisation; solubilisation using micelles.

Module 3

Drug disperse systems: drug emulsions; drug suspensions; applications of disperse systems in delivery of pharmaceuticals; pharmaceutical gels.

Polymers for drug delivery: types of polymer, pharmaceutical polymers, physicochemical properties of polymers and relationship with structure, properties, kinetics, mechanisms and applications, delivery systems for macromolecules.

Module 4

Formulation methods: principles, technology and manufacture of sustained drug delivery systems and applications to therapeutic delivery systems designed to release a specific quantity of drug at controlled rates; Diffusional system, Fick's law of diffusion, transdermal delivery, ocular delivery and intra-uterine system; modified-release by coating: enteric and other coated tablets, particles and other systems.

Module 5

Chemical methods: prodrugs - definition of the prodrug concept, prodrugs of various functional groups, design strategies for modification of drug properties, modification of the physicochemical, Pharmacokinetics and pharmacodynamic properties of a drug through chemical transformation. Applications of the prod rug approach: transport theory, oral absorption, reduction of side effects, Bioavailability.

Name of Text Books:

Pharmaceutical Biotechnology - S.P. Vyas, V.K. Dixit, CBS publication and Distributors.

Name of Reference Books:

Industrial microbiology - L.E. Casida JR, New age International (P) Limited Publication

Introduction to Biopharmaceutics and Pharmacokinetics, Dr. H.P. Tipnis, Dr. M.S. Nagarsenker, Nirali Prakasan Publications.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Bio Informatics Lab
Total Practical Periods: 40
Total Marks in End Semester Exam: 40
Minimum number of class test to be conducted: 2

Branch: Biomedical Engg.
Code: 317621 (17)
Total Tut Periods: NIL

Experiments to be performed: (minimum 10 experiments)

- 1) Determining the relative amino acid composition of a protein to find the characteristic profile for the protein using MATLAB
- 2) Determine the trinucleotides (codon) code for an amino acid using MATLAB.
- 3) Determining Nucleotide Composition using MATLAB
- 4) Filtering of Genes : reduce the size of the data set, identify the genes with missing data using MATLAB
- 5) Determine the sequence alignment using FASTA
- 6) Determine the sequence alignment using BLAST
- 7) Comparing Amino Acid Sequences – Use global and local alignment functions to compare two amino acid sequences.
- 8) Exploring the Phylogenetic Tree – Use the MATLAB command-line interface to programmatically determine characteristics in a phylogenetic tree.
- 9) Analyzing Gene Expression Profiles (i)Exploring the Data Set(ii)Filtering Genes (iii)Clustering Genes(iv)Principal Component Analysis
- 10) Visualizing Micro array Data: (i) Exploring the Micro array Data Set
(ii) Spatial Images of Micro array Data

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Digital Communication System Lab
Total Practical Periods: 40
Total Marks in End Semester Exam: 40
Minimum number of class test to be conducted: 2

Branch: Electrical Engg.
Code: 317622 (28)
Total Tut Periods: NIL

List of Experiment to be performed

1. Study of PCM system-
- 2 Study of DM system
- 3 Study of ASK system
- 4 Study of BPSK system
- 5 Study of DPSK system
- 6 Study of BFSK system
- 7 Study of QPSK system
- 8 Study of PAM system
- 9 Study of PPM system
- 10 Study of PWM system
11. Error calculation of different Techniques

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject: Microcontroller Based Medical Inst. Lab
Total Practical Periods: 40
Total Marks in End Semester Exam: 40
Minimum number of class test to be conducted: 2

Branch: Bio Medical
Code: 317723 (17)
Total Tut Periods: NIL

MICROCONTROLLERS LAB

1. Assembly language programming of 8086

- a) Sorting , code conversion, Pascal's triangle
- b) Matrix multiplication
- c) TSR programming

2. Interfacing experiments of 8086

- a) Stepper motor interface
- b) Display card interface
- c) Hex key board interface
- d) Parallel port interface
- e) ADC/DAC interface

3. Assembly language programming of the 8051

4. Interfacing experiments of 8051

- a) Parallel port and serial port interface
- b) Counter and Timer interface

Other Lab work based on course content as per syllabi.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: VII
Subject : Innovative & Entrepreneurial Skill
Total Practical Periods: 28
Total Marks in End Semester Exam: Nil
Minimum number of class test to be conducted: 2

Branch: Common to All Branches
Code: 300725 (36)
Total Tut Periods: NIL

MODULE I

Innovation: innovation- an abstract concept; creativity, innovation and imagination; types of innovation -classified according to products, processes or business organizations.

MODULE II

Entrepreneurship: who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of Entrepreneurship for sustainable development.

MODULE III

Difference between entrepreneur and entrepreneurship, Difference between entrepreneur and intra-preneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

MODULE IV

Identification of Business Opportunities: Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

MODULE-V

Techno-Economic Feasibility of the project: Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Proforma of Feasibility Report, Role of Institutions and entrepreneurship.

Text and Reference Books:

1. Competing through Innovation-Bellon & Whittington, Prentice Hall of India
2. A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
3. Entrepreneurship- Rober D Hisrich, Peters, Shepherd- TMH
4. Entrepreneurship in Action- Coulter, Prentice Hall of India
5. Entrepreneurship Management and Development – Ajith Kumar, HPH
6. Fundamentals of entrepreneurship- Mohanty, PHI
7. Patterns of Entrepreneurship- Jack M Kaplan, Wiley, student Edition.