Mathematics-II

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
Biomedical Engineering	Mathematics-II	B.E. 301	Min."D"		5.0

Unit I

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform.

Unit II

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

Unit III

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method

Unit IV

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation of nth order with constant coefficients. Separation of variable method for the solution of wave and heat equations

Unit V

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem

References

(i) Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
(ii) Higher Engineering Mathematics by BS Grewal, Khanna Publication
(iii) Advance Engineering Mathematics by D.G.Guffy
(iv) Mathematics for Engineers by S.Arumungam, SCITECH Publuication
(v) Engineering Mathematics by S S Sastri. P.H.I.

Biomedical Physics

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
Biomedical Engineering	Biomedical Physics	B.E.-BM 302	Min."D"		5.0

Unit-I

Bioelectricity: Theory of diffusion & permeability through biological membrane, Resting Membrane potential, Generation & transmission of impulses, Ionic channels, monophasic and biphasic recordings, Electrical activity of the heart Pace maker potential, Electrocardiography. Biological transducers, Receptor potentials. Electrical activity of the brain, Hodgin- Huxley model of squid giant axon. Contemporary models of neurons Synaptic transmission.

Unit-II

Elasticity of living cell materials ,Elasticity and braking strength of bones, Muscle as a helical spring, Introduction of biomaterials, Structure and properties of material used as implants: Polymer, Ceramics, Metals composite bone cements , Tissue material. Tissue responses to implant, Cellular responses to foreign soft and hard tissues, uses of implants, Viscosity of Elemental protoplasm and its determination in cell, Role of viscosity in preparation and use of Pharmaceuticals, Surface energies of living materials, Surface tension of Bio-Fluids and its measurement.

Unit-III

Radiation Biophysics-Radio Emission – Law of radioactive decay half life period- Production of radioisotopes for medical use, Generation & sources of electromagnetic radiation, Interaction of radiation with matter and tissue, Useful and harmful effects of magnetic fields, Radio waves, Micro waves, Ultraviolet radiation and infrared red thickness- Photo electric, Compton and pair production process and their significance in radiology. Radiation units-Detection and measurements of radiation.

Unit-IV

Fluid Biophysics System, Fluid flow across the membrane, Fick's diffusion equation, coefficient of diffusion and permeability constant and their role in therapeutics, Influence of tubewell, Radius of tube, Length of tube and R.B.C. concentration on blood flow, Total energy equation for blood. The heart as a pump.

Unit-V

Thermodynamics of living System: Living body as a thermodynamics system, Thermodynamic laws applied to bio-systems, Expressions for changes in internal energy and negative entropy change in living systems, Application of heat & mass Transfer principles to biological systems. Heat exchange, between a biological system & environment, Effect of hypothermia and hyperthermia, Production of ultra low and low temperature for medical use.

References:

1. Biophysics; Cotteril, wiley Publisher
2. Methods in modern biophysics- Benget Notling, Springer
3. Biophysics- Pattabhi, Gautham, Kulwer Acad Publisher
4. Massey and Meredeth, “Medical Physics”.
5. David Freifelder, “Molecular Biology”, Johns and Bartlet
6. David Cooney, “Principles of Biomedical Engineering”.
7. Ruch and Patton, “Bio Physics and Medical Physiology”

Human Physiology-I

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
Biomedical Engineering	Human Physiology-I	B.E.-BM303	Min."D"	Min."D"	5.0

Unit-I

Cytology: Cell Structure, various cell organelles and their functions. Tissue, their types, structure and functions. Skeleto-muscular system, Different types of muscles and their function.

Unit-II

Hematology: Blood composition, properties and function, Coagulation, Blood groups lymphatic systems, Reticule endothelial systems & defense mechanism of the body. Blood Groups, Hemoglobin estimation - RBC counting and WBC counting - platelet counting - Normal values.

Unit-III

Cardiovascular System: Cardiac cycle- Heart sounds (PCG), Cardiac outputs, Blood flow, Blood pressure, arterial pulse and heart rate. Electrocardiogram (ECG).

Unit IV

Respiratory system: Mechanics of respiration, Lung volumes and capacities, Transport of gases and control of respiration.

Unit V

Renal function: Process involved in Urine Formation, Micturition, Composition of urine and principles of Haemodyialysis, temperature regulation.

References:

1. Text book of Human Physiology; Guyton, Saunderson.
2. Essentials of Anatomy & Physiology; Seeley, MGH
3. Human Physiology & Anatomy; Marieb, Adison Wesley
4. Principles of Anatomy & Physiology; Tortora, Wiley
5. Human Physiology (Vol I & II); Chatterjee, MAA
6. Medical Physiology; Marya, CBS
7. Essentials of Medical Physiology; Sembulingam, Jaypee

List of Experiments (Expandable):

1. Qualitative test for ABO grouping with antisera.
2. Determination of blood clotting time.
3. Determination of bleeding time.
4. Leucocytes count by Heamocytometry.
5. Erythrocytes count by Heamocytometry.
6. Determination of Heamoglobin.
7. Platelets count by Heamocytometry.

Electronics-I

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
Biomedical Engineering	Electronics-I	B.E.-BM304	Min."D"	Min."D"	5.0

Unit-I

Semi conductor diodes, Ideal diode & practical diodes, Diode equivalent circuit and frequency response power dissipation in diode, Diode clipping and clamping circuit, Testing, Graphical analysis of diodes circuits, Types of diodes and their applications, Signal diodes, Power diode, Zener Diode, Varactor diode, Schottky diode, Pin diode, Tunnel diode, Direct tunneling equivalent circuit, Tunnel diode oscillator, Diode fabrication and packaging, Stability consideration, Power diode, Solar cell, LED, LEDs specification geometry of LEDS, Advantage and disadvantage, Colours of LEDs and construction, LCD, Diode resistance and capacitance, Rectifiers.

Unit-II

Transistor, Characteristics, Transport phenomenon, DC load lines, Biasing, Type of biasing, Comparison model, Thermal stability, DC load line, AC by pass, Switching Circuits, Transistor and h parameters, CE, CB, CC, h in parameters model comparison conversion, Transistor switching, Testing, Millers Effect, Decibel & Frequency response, Voltage current and power gain, Designing of basic amplifier circuit, JFET construction, Operation, Transfer characteristics MOSFET, Types of MOSFET, Characteristics and applications, parameter model RC coupled amplifier, Cascading, Effect of cascading in B.W. Darlington amplifier, Boot strapping, Stability and thermal consideration, Noise in BJT.

Unit-III

Feedback amplifiers & oscillators: Negative and positive feedback, gain and sensitivity, B.W. Types of feedback, Oscillator, Types of oscillator and application, Design problem with feedback amplifier and oscillators, UJT characteristics and application, Multi vibrator circuits and their applications.

Unit-IV

Power amplifier and Regulators Classification, Types of power amplifier circuits, Their applications, Complementary symmetry circuits, Push pull amplifier, Cross over distortion, Biasing of power amplifier, Heat sink, Derating curve Regulator: Classification of voltage regulator, Types of voltage regulator, Current initiating circuits, Adjustable voltage regulators, 3 terminal positive series regulators, Dual IC power supply SMPS.

Unit-V

Design and application of electronic circuits, Design and application of passive filter, Designing of clipper and clamper. Circuits, Designing of power amplifiers, Feedback amplifier, Oscillators and DC coupled amplifier circuits, Designing of multivibrators circuits.

References:

Millman Halkias, “Microelectronics”, Tata McGraw Hill.
Sedra Smith “Electronics Devices” Wiley Eastern Pub.
David Bell “Electronics Devices & Circuits”, Prentice Hall of India.
Boyelstad & Neshlsky “Electronics Devices & Circuits”, Prentice Hall of India.
Floyd, “Electronic Devices & Circuits” Asea Pearson
Nagrath” Electronic Devices & Circuits”, PHI

Network Analysis

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
Biomedical Engineering	Network Analysis	B.E.-BM 305	Min."D"	Min."D"	5.0

Unit I

Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, analysis of magnetically coupled circuits, Transient analysis :- Transients in RL, RC&RLC Circuits, initial conditions, time constants. Steady state analysis- Concept of phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks, Dot convention, coupling co-efficient, tuned circuits, Series & parallel resonance.

Unit II

Network Theorems for AC & DC circuits- Thevenins & Norton's, Superpositions,Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

Unit III

Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

Unit IV

Concept of signal spectra, Fourier series co-efficient of a periodic waveform, symmetries as related to Fourier coefficients, Trigonometric & Exponential form of Fourier series.

Unit V

Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z,Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Terminated two port network.

References:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH
7. Decarlo lin; Linear circuit Analysis; Oxford
8. William D Stanley : Network Analysis with Applications, Pearson Education
9. Roy Choudhary D; Network and systems; New Age Pub
10. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits :TMH
11. Chakraborti :Circuit theory: Dhanpat Rai
12. B.Chattopadhyay & P.C.Rakshit; Fundamental of Electrical circuit theory; S Chand
13. Nilson & Riedel , Electric circuits ;Pearson

List of experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps.
Step 1:Circuit should be designed/ drafted on paper.
Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).
Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To Verify Thevenin Theorem.
2. To Verify Superposition Theorem.
3. To Verify Reciprocity Theorem.
4. To Verify Maximum Power Transfer Theorem.
5. To Verify Millman's Theorem.
6. To Determine Open Circuit parameters of a Two Port Network.
7. To Determine Short Circuit parameters of a Two Port Network.
8. To Determine A,B, C, D parameters of a Two Port Network
9. To Determine h parameters of a Two Port Network
10. To Find Frequency Response of RLC Series Circuit.
11. To Find Frequency Response of RLC parallel Circuit.

Computer Programming –III

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
Biomedical Engineering	Computer Programming –III	B.E.-BM 306		Min."D"	5.0

UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT–II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT–III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, ultithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT–IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

UNIT–V

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:

1. Deitel & Deitel, ”JAVA, How to Program”; PHI, Pearson.
2. E. Balaguruswamy, “Programming In Java”; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, “Peter Norton Guide To Java Programming”, Techmedia.
5. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall

List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance
6. Write a program to show Polymorphism
7. Write a program to show Interfacing between two classes
8. Write a program to Add a Class to a Package
9. Write a program to demonstrate AWT.
10. Write a program to Hide a Class
11. Write a Program to show Data Base Connectivity Using JAVA
12. Write a Program to show “HELLO JAVA ” in Explorer using Applet
13. Write a Program to show Connectivity using JDBC
14. Write a program to demonstrate multithreading using Java.
15. Write a program to demonstrate applet life cycle.

BM -307 - Self Study (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

BM -308 Seminar / Group Discussion(Internal Assessment)

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.