Electronic Circuit Analysis and Design – I [ECAD-I]

S.E. Sem. III [BIOM]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	2 Hrs.	50
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. **Diode Circuits**
   Design of Rectifier Circuits, Half Wave Rectification, Full Wave Rectification, Filter Ripple Voltage and Diode Current, Voltage Doubler Circuit, Zener Diode Circuits, Clipper and Clamper Circuits, Multiple–Diode Circuits, Photodiode and LED Circuits.

2. **The Bipolar Junction Transistor**
   BJT Biasing, DC analysis, Configurations (CB, CC, CE), Stability, Multistage (Cascade and Cascode Amplifiers).

3. **The Bipolar Junction Transistor Amplifiers**
   The Bipolar Linear Amplifier, Graphical Analysis and AC Equivalent Circuit, Small Signal Hybrid–π Equivalent Circuit of the Bipolar Transistor, Hybrid–π Equivalent Circuit including the Early Effect, Expanded Hybrid–π Equivalent Circuit, Small signal analysis of BJT using h parameter, r_e model, Basic Transistor Amplifier Configurations, Common Emitter Amplifiers, AC Load Line Analysis, Common Collector Emitter Follower Amplifier, Common Base Amplifier, The Three Basic Amplifier Configurations : Summary and Comparison, Multistage Amplifiers (Cascade and Darlington), Two stages RC coupled amplifier. Power Considerations, Environmental and Thermal Considerations in Transistor Amplifiers, Manufacturer's Specifications.

4. **The Field Effect Transistor**
   Junction Field–Effect Transistor, MOS Field–Effect Transistor, MOSFET DC Circuit Analysis, Basic MOSFET Applications: Switch, Digital Logic Gate and Amplifier. Temperature effects in MOSFETs, Input Protection in MOSFET, The Power FET (VMOS), Power MOSFETs.

5. **Basic FET Amplifiers**
   The MOSFET Amplifier, Basic Transistor Amplifier Configurations, Common Source Amplifier, Source Follower Amplifier, Gate Configuration, Basic Amplifier Configurations: Summary and Configuration, Single– Stage Integrated Circuit MOSFET, Amplifiers, Multistage Amplifiers, Basic JFET Amplifiers.

6. **Frequency Response of Amplifiers**
   Amplifier Frequency Response, System Transfer Functions, S–Domain Analysis, First Order Functions, Bode Plots, Short Circuit and Open Circuit Time Constants. Frequency Response : Transistor Amplifiers with Circuit Capacitors, Frequency Response : Bipolar Transistor, Frequency Response : The FET, High Frequency Response of Transistor Circuits.

7. **Differential Amplifiers**
   Basic BJT and JFET and differential amplifiers, constant current source and current mirror circuits, differential amplifiers with active loads.

Reference :

1. Electronics Devices & Circuits (*Boylested Robert L., Nashelsky Louis*) Pearson Education.
2. Electronics Devices and Circuits (*David A. Bell*) Oxford University Press, (5th Edition).
3. Electronics Circuit Analyzer & Design (*Neamen Donald A.*) Tata McGraw Hill (2nd Edition).
4. Semiconductor Data Monual (BPB Publications).

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Electrical Network Analysis and Synthesis [ENAS]

S.E. Sem. III [BIOM]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	2 Hrs.	50
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. **Review**
   D.C. and A.C. circuits.

2. **Mesh and Node Analysis**
   Mesh and Node Analysis of circuits with independent and dependent sources.

3. **Linearity, Superposition and Source Transformation**
   Linearity, Superposition, Current and Voltage Source Transformation.

4. **Network Theorems**
   Thevenin & Norton's Theorem (with independent and dependent sources). Maximum power transfer theorem.

5. **Circuit Analysis**
   Introduction to Graph Theory, Tree, link currents, branch voltages, cut set and tie set Mesh and Node Analysis, Gauss Elimination Technique, Duality.

6. **Time and Frequency Response of Circuit**
   First and second order Differential equations, initial conditions, Evaluation and Analysis of Transient Steady state responses using Classical Technique as well as by Laplace Transform (for simple circuits only). Transfer function, Concept of poles and zeros. Frequency response of a system (concepts only), stability criteria and bode plot (concepts only).

7. **Two–port Networks**
   Concept of two–port network. Driving point and Transfer Functions, Open Circuit impedance (Z) parameters, Short Circuit admittance (Y) parameters, Transmission (ABCD) parameters. Inverse Transmission (A'B'C'D') parameters. Hybrid (h) parameters. Inter Relationship of different parameters. Interconnections of two–port networks. T and Pi representation. Terminated two–port networks.

8. **Fundamentals of Network Synthesis**
   Positive real functions, Driving Point functions, Brono's Positive real functions, Properties of positive real functions. Testing Positive real functions. Testing driving point functions, Maximum modulus theorem, Properties of Hurwitz polynomials, Residue computations, Even and odd functions, Sturm's theorem. Driving Point Synthesis with L–C, R–C, R–L and R–L–C networks.

Reference :

1. Circuits and Networks (*Sudhakar & S.P. Shyammohan*) Tata McGraw Hill, 2000 (13th Reprint).
2. Engineering Circuits Analysis, (*William H. Hayt, Jack E. Kemmerly & Steven M. Durbin*) McGraw Hill International, 2002 (16th Edition).
3. Introduction to Modern Network Synthesis (*M.E. Van Valkenburg*) Wiley Eastern Ltd.
4. Linear Circuit Analysis (*Artice M. Davis*) Thomson Asia Pvt. Ltd., Singapore, 2001 (1st Edition).
5. Linear Circuit Analysis (*Raymond A. DeCarlo & Pen-Min Lin*) Oxford University Press, 2001 (2nd Ed.)
6. Network Analysis (*M.E. Van Valkenburg*) Prentice Hall of India (3rd Edition).

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Engineering Mathematics – III [EM-III]

S.E. Sem. III [BIOM]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	–

SYLLABUS

1. Laplace Transform

Functions of bounded variations.

Laplace Transforms of 1, t^n, e^{at}, sin at, cos at, sinh at, cosh at, erf (t) Linear property of L.T. First shifting theorem, Second shifting theorem,

$$L\left\{t^n f(t)\right\}, L\left\{\frac{f(t)}{t}\right\}, L\left\{\int f(u)du\right\}, L\left\{\frac{d^n}{dt^n f(t)}\right\}$$

Change of scale property of Laplace Transforms Unit step function, Heavy side, Dirac delta functions, Periodic functions and their Laplace Transforms.

(a) Inverse Laplace Transforms : Evaluation of inverse L.T., partial fractions method, convolution theorem.

(b) Applications to solve initial and boundary value problems involving ordinary diff. Equation with one dependant variable.

2. Complex Variables

Functions of complex variables, continuity and derivability of a function, analytic functions, necessary condition for f(z) to be analytic, sufficient condition (without proof), Cauchy-Riemann conditions in polar forms. Analytical and Milne-Thomson method to find analytic functions f(z) = u + iv where (i) u is given (ii) v is given (iii) u + v (iv) u–v is given. Harmonic functions and orthogonal trajectories.

(a) Mapping : Conformal mapping, Bilinear mapping, fixed points and standard transformation, inversion, reflection, rotation and magnification.

(b) Line Integral of function of complex variable, Cauchy's theorem for analytical function (with proof), Cauchy's Goursat theorem (without proof), properties of line integral, Cauchy's Integral formula and deduction.

(c) Singularities and poles : Taylor's and Laurent's development (without proof), residue at isolated singularity and it's evaluation.

(d) Residue theorem application to evaluate real integrals of type

$$\int_0^{2\pi} f(\cos\theta, \sin\theta)\, d\theta \quad \text{and} \quad \int_{-\infty}^{+\infty} f(x)\, dx$$

3. Fourier series

Orthogonality and orthogonal functions, Expression for the function in a series of orthogonal functions. Dirichlet's conditions, Fourier series of periodic functions with period 2pi or 2ℓ. (Derivation of Fourier coefficients a0, an, bn is not expected) Dirichlet's theorem Even and Odd functions. Half range sine and cosine expressions Parsaval's identities (without proof).

(a) Complex form of Fourier Series :

Fourier transform and Fourier integral in detail.

Reference :

1. Textbook of Applied Mathematics (*Wartikar P.N., Wartikar J.N.*) Pune Vidyarthi Griha Prakashan, 1981.
2. Advanced Engineering Mathematics (*Kreyszig Erwin*) Wiley Student Edition – New Delhi, 2006 (8^{th} Edition).
3. Complex Variables (*Churchil*) McGraw Hill.
4. Theory of Function Complex Variable (*Shantinarayan*) S. Chand & Co.
5. Engineering Mathematics (*Shastri S.S.*) Prentice Hall.
6. Advanced Modern Engineering Mathematics (*Glyn James*) Pearson Education Ltd., 2004 (3^{rd} Edition)

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Human Anatomy and Physiology [HAP]

S.E. Sem. III [BIOM]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral Exam	–	25
#Oral on Hospital Visit	2 Hrs.	50
Term Work	–	25

SYLLABUS

Anatomy :

1. **Cell :** Structure and functions of cell. Polarization and depolarization of cell.

2. **Body Structure :** Basic tissues and their functions in brief, Outline of structures of the following system. Cardiovascular System, Respiratory System, Alimentary System, Central Nervous System, Reproductive System, Urinary System, Skeletal System, Muscular System, Endocrine System, Special Organs – Eye and Ear, Integumentary system (Skin Study).

Physiology :

1. **Cardiovascular System :**
   Heart, Conductive tissues of heart, Cardiac cycle, Heart Valves, System and Pulmonary Circulation, Transmission of Cardiac Impulse, Blood Pressure, ECG (Einthoven's Triangle, Various leads and Waveforms).
2. **Respiratory System :**
   Respiration external (ventilation) Exchange in gases in the alveoli, Artificial respiration. Spiro meter (Forced expiratory volumes) peak flow meter.
3. **Alimentary System :** All organs of the digestive system, other secretions and main functions, Deglutition and defecation.
4. **Blood :** Composition of blood–Blood cells and their functions. Cell counting, Hemoglobin, Blood groups, Coagulation, Blood transfusion.
5. **Excretory System :** Structure of Nephron, formation of urine and function of Kidney, Urinary Bladder, urethra, internal/external sphincters.
6. **Nervous System :** Different parts, their functions. Reflex actions and reflex are, Function of Sympathetic and Parasympathetic nervous system. Never conduction and action potentials.
7. **Reproductive System :** (Male and Female) Different organs and their functions. Main actions of Androgens, Oestrogens and Progesterone.
8. **Endocrine System :** All glands, their secretions and functions. Control of secretions.
9. **Eyes and Ears :** Eyes–Structure, Refractive Medias of the eye, formation of image on the Retina, Ophthalmoscope. Ear – Structure of Cochlea, Hearing mechanism, type of Deafness. Hearing aid.
10. Muscle physiology and aspects of skin resistance.

Reference :

1. Anatomy and Physiology in Health and Illness (*Roos and Wilson*) ELBS Publication.
2. Essentials of Anatomy and Physiology (*Elaine N. Marieb*) Pearson Education.
3. Physiology of Human Body (*Guyton*) Prism Book.
4. Review of Medical Physiology (*William Ganong*) Prentice Hall International.
5. Principles of Anatomy and Physiology (*Tortora and Grabowski*) Harper Collin Publication.
6. Anatomy and Physiology (*Elaine N. Marieb*) Pearson Education.

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Biomaterials [BM]

S.E. Sem. III [BIOM]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral Exam	–	–
Oral Exam	2 Hrs.	25
Term Work	–	25

SYLLABUS

1. **Introduction**
   Introduction of Biomaterials, Classification of Biomaterials.

2. **Properties and Applications of Metallic Biomaterials**
   Stainless steel, Titanium, Titanium based alloys, Cobalt – Chromium alloys in fabrication of biodevices and implants.

3. **Properties and Applications of Polymeric Biomaterials**
   Classification, polyurethanes, PTFE, Polyethylene, Polypropylene, Polyacrylates, PMMA, PHEMA, Hydrogel, Silicone rubber, Biopolymer in fabrication of biodevices and implants.

4. **Properties and Applications of Ceramic Biomaterials**
   Bioceramics-classifications, Alumina, Zirconia and types, Bioglass. Hydroxyapatite, Tricalcium phosphate in fabrication of biodevices and implants.

5. **Composite Biomaterials**
   Properties and Applications of Composite Biomaterials in fabrication of biodevices and implants.

6. **Properties and Applications of Degradable Biomaterials**
   Polymers and Ceramics in fabrication of biodevices and implants.

7. **Biomaterials for Soft Tissue Replacements**
   Properties and Applications of biomaterials for Soft Tissue Replacements.

8. **Properties and Applications of Materials used in Prosthetics**
   The Indigenous metals and their alloys, Different types of leather, Types of rubber, Thermoplastic and thermosetting resins, Wood and binding materials.

9. **Surface properties of Biomaterials**
   Surface properties of Biomaterials and their testing with reference to biological safety.

10. **Testing of Biomaterials**
    Biological Testing of Biomaterials, Biocompatibility of Materials, Biomaterials corrosion and wear.

Reference :

1. Biomaterial Science and Engineering (*J.V. Park*) Planum Press-New York.
2. Fundaments of Biomedical engineering (*G.S. Sawhney*) New Age International Publication.
3. Biomaterial Science : An Introduction to Materials in Medicine (*Rotner & Hoffmann*).
4. Encyclopaedia of Medical Devises and Instrumentation (*John G. Webster*) Vol. 1, 2, 3, 4; Marcel Dekkar Publication.

5. Encyclopaedia − Handbook of Biomaterials and Bioengineering : Part−A : Materials Vol. 1, 2; Part−B : Applications Vol.1, 2; Marcel Dekkar Publication.
6. Design Engineering on Biomaterials for Medical Devices (*David Hill*) John Willey Publication.
7. Biomaterials & Bioengineering Handbook (*Donald L. Wise*).
8. Biological Performance of Materials (*Jonathan Black*) Marcel Dekkar Inc. New York, Basel, Hong Kong.

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Electronic circuit analysis. Lecture notes. B.tech (II year â€“ II sem).Â Ð‡ To familiarize the student with the analysis and design of basic transistor amplifier circuits and their frequency response characteristics, feedback amplifiers, oscillators, large signal amplifiers and tuned amplifiers. Ð‡ To demonstrate basic understanding of amplifier operation. Ð‡ To analyze amplifier circuits using hybrid model. UNIT - I SINGLE STAGE AMPLIFIERS: Classification of amplifiers, Transistor hybrid model, Analysis of a transistor CE, CB & CC amplifier circuit using simplified h-parameters, Analysis of CE amplifier with emitter resistance and emitter follower. Electronics and Electrical Students will find these books useful.Â Elements Of Electromagnetics - Sadiku - 3rd ed.pdf download. 220.2M. Neamen - Electronic Circuit Analysis And Design.pdf download. 18.7M. [Solutions Manual] Elements of Electromagnetics - Sadiku - 3rd.pdf download. General opâˆ’amp circuit design and detailed circuit description. 4. Sinusoidal Oscillators Using Opamps Phase shift oscillators, Wein bridge oscillators, Tuned circuit oscillators, Colpitts oscillators and Hartely oscillators. 5. Voltage References and Voltage Regulators Basics and types of voltage regulators.Â Dead Time Element, Dynamic Response of a Measurement system. 2. Electronic meter Principle of Operation, ammeter, ohmmeter, voltmeter, Advantages over Conventional type Analog Voltmeter, Factors involved in selection of Voltmeter, FET Voltmeter, Peak Responding, Average Responding, and True RMS responding voltmeter, Multimeter. 3. Digital Voltmeter Methods of Analog to Digital and Digital to Analog Conversion.