Electronic Circuit Analysis and Design – I [ECAD-I]
S.E. Sem. III [BIOM]

EVALUATION SYSTEM

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<tr>
<td>Theory Exam</td>
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<tr>
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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**

4. **The Field Effect Transistor**

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**

7. **Differential Amplifiers**
   Basic BJT and JFET and differential amplifiers, constant current source and current mirror circuits, differential amplifiers with active loads.
Reference:
Electrical Network Analysis and Synthesis [ENAS]
S.E. Sem. III [BIOM]

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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**

8. **Fundamentals of Network Synthesis**

Reference:
5. Linear Circuit Analysis (Raymond A. DeCarlo & Pen-Min Lin) Oxford University Press, 2001 (2nd Ed.)
Engineering Mathematics – III [EM-III]
S.E. Sem. III [BIOM]

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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,
   \[ L\{t^n f(t)\}, L\left(\frac{f(t)}{t}\right), L\{\int f(u)du\}, L\left(\frac{d^n}{dt^n}f(t)\right) \]
   Change of scale property of Laplace Transforms Unit step function, Heavy side, Dirac delta functions, Periodic functions and their Laplace Transforms.
   (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 \( 2\pi \) or \( 2\ell \).
   (Derivation of Fourier coefficients a0, an, bn is not expected) Dirichlet’s theorem Even and Odd functions. Half range sine and cosine expressions Parseval’s identities (without proof).
   (a) Complex form of Fourier Series:
   Fourier transform and Fourier integral in detail.
Reference:
4. Theory of Function Complex Variable (Shantinarayan) S. Chand & Co.
SYLLABUS

Anatomy:

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


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.


5. **Excretory System**: Structure of Nephron, formation of urine and function of Kidney, Urinary Bladder, urethra, internal/external sphincters.


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.


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.
6. Anatomy and Physiology (Elaine N. Marieb) Pearson Education.
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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:
2. Fundaments of Biomedical engineering (G.S. Sawhney) New Age International Publication.
4. Encyclopaedia of Medical Devises and Instrumentation (John G. Webster) Vol. 1, 2, 3, 4; Marcel Dekkar Publication.
6. Design Engineering on Biomaterials for Medical Devices (David Hill) John Willey Publication.
Circuit analysis is the process of finding all the currents and voltages in a network of connected components. We look at the basic elements used to build circuits, and find out what happens when elements are connected together into a circuit. If you're seeing this message, it means we're having trouble loading external resources on our website. If you're behind a web filter, please make sure that the domains *.kastatic.org and *.kasandbox.org are unblocked. Courses. Search. Donate Login Sign up. Search for courses, skills, and videos. Main content. Electrical engineering. Unit: Circuit analysis. Electrical engineering. Unit: Circuit analysis. Lessons. Circuit elements. Circuit Analysis I with MATLAB® Computing and Simulink® / SimPowerSystems® Modeling Copyright Â© 2009 Orchard Publications. All rights reserved. Printed in USA. The text is an expansion of our previous publication, Circuit Analysis I with MATLAB® Applications, ISBN 978-0-9709511-2-0, and this text, in addition to MATLAB scripts for problem solution, includes several Simulink® and SimPowerSystems® models. The pages where these models appear are indicated in the Table of Contents. Electronics and Electrical Students will find these books useful. 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. Circuit Analysis and Design, 4th edition Chapter 1 By D. A. Neamen Problem Solutions _V0 = VZ = VZ 0 + I Z rZ = 6.798 + (0.006158)(20) V0 = 6.921 V b. I = IZ + IL 10 − V0 V0 − 6.798 V0 = 0.50 0.020 1 10 6.798 ⎡1 1 1⎤ + = V0. Â VT ln ⎜0 ⎟ âŽ IS R _Microelectronics: Circuit Analysis and Design, 4th edition Chapter 2 By D. A. Neamen Problem Solutions _2.3 âŽ: 1âŽ (a) Î… S = 120 2 âŽœ å¥Ž = 16.97 V (peak) å¥Ž 10 â¥Ž Î… O (peak ) = = 16.27 V 16.27 (b) i D (peak ) = = 8.14 mA 2 (c) Î… O =.