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:
4. Semiconductor Data Monual (*BPB Publications*).
EVALUATION SYSTEM

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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.)
SYLLABUS

1. **Laplace Transform**
   Functions of bounded variations. 
   Laplace Transforms of \(1, t^n, e^{at}, \sin at, \cos at, \sinh at, \cosh at, \text{erf}(t)\) 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 \(2\pi\) or \(2\ell\).
   (Derivation of Fourier coefficients \(a_0, a_n, b_n\) 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.
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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.
Biomaterials [BM]
S.E. Sem. III [BIOM]

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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.
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 Dekker Publication.
6. Design Engineering on Biomaterials for Medical Devices (David Hill) John Willey Publication.

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.

To demonstrate basic understanding of amplifier operation.

To analyze amplifier circuits using hybrid model.


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.


Sinusoidal Oscillators Using Opamps Phase shift oscillators, Wein bridge oscillators, Tuned circuit oscillators, Colpitts oscillators and Hartely oscillators.

Voltage References and Voltage Regulators Basics and types of voltage regulators.

Dead Time Element, Dynamic Response of a Measurement system.


Digital Voltmeter Methods of Analog to Digital and Digital to Analog Conversion.