Baba Ghulam Shah Badshah University
Rajouri (J&K)-185131

Syllabus Third Semester
B. Tech. Degree Course

Department of Electrical Engineering

College of Engineering and Technology
School of Mathematical Sciences & Engineering
Baba Ghulam Shah Badshah University
Rajouri (J&K)-185131

Course Title: Mathematics-III **Max Marks: 100**
Course Code: ERE-321 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Curriculum Structure

Semester-III

Theory Courses

Course Code	Title	Scheme of Exam				Hrs./Week		
		Duration (Hrs.)	IA	UE	Total Marks	L	T	P
ERE-321	Mathematics-III	3	40	60	100	4	0	0
ERE-322	E M Wave Theory	3	40	60	100	3	1	0
ERE-323	Electrical Machines-I	3	40	60	100	3	1	0
ERE-324	Signals & Systems	3	40	60	100	3	1	0
ERE-325	Digital Electronics	3	40	60	100	3	1	0
ERE-326	Applied Electronics	3	40	60	100	3	1	0
Total			**240**	**360**	**600**			

Laboratory Courses

ERE-331	Electrical Machines-I	2	25	25	50	0	0	2
ERE-332	Digital Electronics	2	25	25	50	0	0	2
ERE-333	Applied Electronics	2	25	25	50	0	0	2
Total			**75**	**75**	**150**			
Total (Theory + Lab)			**315**	**435**	**750**			

Semester III

Objective: The course is designed to provide basic knowledge of special functions and transform to engineering students.

Unit-I

Series Solution and Special Functions-I: Validity of series solution of the type $P_0(x)y'' + P_1(x)y' + P_2(x)y = 0$, Frobenius method, Legendre's differential equation, Legendre's polynomial, Rodrigue's Formula, generating function for $P_n(x)$, Recurrence formulae, Orthogonality of Legendre's polynomials, Fourier-Legendre Expansion of $f(x)$.

Unit-II

Integral Transform-I: Introduction, Laplace transform, Existence theorem, Properties and theorem of Laplace transform, Laplace transform of unit-step function, impulse function, periodic function and error functions, Inverse Laplace transform, Convolution theorem. Applications of Laplace transform in solving differential and integro-differential equations.

Unit-III

Integral Transform-II: Fourier integral, Fourier Sine and Cosine integrals, Complex form of Fourier integral, Fourier transform, Inverse Fourier transform, Fourier Sine and Cosine transforms, Properties of Fourier transform, Inverse Fourier transform, Convolution theorem, Parseval's identities for Fourier transforms, Fourier transform of the derivatives of a function, Applications of F-transform to Boundary Value Problems.

Unit-IV

Statistics and Probability-I

Measurement of central tendency-Mean, Median, mode, standard Deviation(S.D), Methods for S.D(shortest methods), moment of variable, co-relation, methods for computing coefficients of co-relation(Shortcut method), regression analysis, definition of probability , laws of probability, conditional probability.

Unit-V

Statistics and Probability-II:

Introduction to random variable, discrete and continuous variables, discrete probability distribution, binomial distribution, Mean, standard Deviation and Moment Generating functions(MGF) of binomial distribution, Poisson's distribution-Mean, S.D and MGF of Poisson's distribution. Continuous probability distribution- Mean, S. D and MGF of continuous probability distribution.

Text Books:

1. **H. K. Das**, Advanced Engineering Mathematics.
2. **T.Veerarjan, "**Probability, statistics and random Processes" TMH

Reference Books:

1. **Babu Ram**," Engineering Mathematics" Pearson Publication.
2. **Schaum's Series Publication,** Discrete Mathematics.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions ,selecting one question from each unit.

Semester III

Course Title: Electromagnetic Wave Theory **Max Marks: 100**
Course Code: ERE–322 **University Exam:60**
Duration of Exam: 3 Hours **Internal Assessment:40**

Objective: The course has been designed to acquaint the students with basic concepts of Electromagnetic theory.

Unit-I

Vector Calculus: Review of vector analysis, Scalar & vector products, gradient, divergent and curl of a vector and their physical explanation-Divergence, Stokes theorems. Transformation amongst rectangular, cylindrical and spherical co-ordinate system.

Unit-II

Electrostatics: Coulomb's law, application of coulombs law, electric field intensity from point charges, field due to continuous distribution of charges, gauss's law, application of gauss's law, Electric displacement and displacement density potential function, potential field of a point charge, laplace's and poison's equations.

Unit-III

Magnetostatics: Magnetic field intensity and magneto motive force, Ampere's Circuital law,applications of amper's circuitary law, Biot-savart law and its application, vector potential, magnetic dipole. Ampere's work law in differential vector form, continuity of currents, conduction and displacement current.

Unit-IV

Time Varying Fields: Faradays law, Maxwell's equations (Differential, Integral and Phasor forms). Uniform plane waves. Representation of wave motion in free space, perfect dielectrics and Lossy dielectrics (Wave equations). Pointing Theorem and Power density. Propagation in good conductor and Skin effect. Reflection of Uniform plane waves .

Unit-V

Introduction To Wave Guides:Waves between parallel plane; Transverse Electric wave, Transverse magnetic waves; characteristics of TE & TM waves; Transverse Electromagnetic waves; velocity of propagation; Attenuation in parallel plane guides; wave impedance.

Text Books

1. **Hayt W.**, Engineering Electromagnetics, TMH. (5^{th} or 8^{th} edition).
2. **Prasad K. D.**, Antenna and Wave Propagation, Satya Prakashan.

Reference Books

1. **Griffith**, Electromagnetics, PHI
2. **Guru & Hizirogli**, Electromagnetic field theory fundamental, Thomson Publication.
3. **Kraus J. D.**, Electromagnetics, TMH, 4th Edition.

Note for Paper Setter: The Question paper shall comprises of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.

SEMESTER III

Course Title: Electric Machines-I **Max Marks: 100**
Course Code: ERE-323 **University xamination:60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The course has been designed to acquaint the students with construction and working of transformers and DC Machines.

Unit I

Transformers: Construction and working principle, classification, concept of ideal transformer, emf equation, transformer on load, phasor diagram on no load and on load, equivalent circuit, O.C and S.C tests. Losses and efficiency, All day efficiency, Voltage Regulation. Parallel operation of single phase transformer. Frequency response & excitation phenomenon of single phase transformers. Auto Transformer:Principle of operation, advantages.

Unit II

Three Phase & Special Purpose Transformers: Principle of operation, construction, 3 phase transformer connections, open delta (V-V) connection, Phase conversions of 3 phase transformer (Scott Connections), Transformer ratings , Parallel operation.Special purpose transformers – Impedance matching transformers, Isolation transformers, constant current & constant voltage transformers. Instrument transformers (Introduction)

Unit III

D C Generators: Principle of operation, construction, EMF & torque equation, power stages, losses & efficiency classification of D.C. generators, various characteristics, parallel Operation of D.C Generators, commutation & armature reaction.

Unit IV

D C Motors: Construction and principle of operation, classification, Emf & torque equation, characteristics of d. c. motors and their applications, speed control of various types of dc motors.

Unit V

D C Motor Starting & Braking: Necessity of starter, three point starter, four point starter, grading of starting resistance, thyristor controlled starters**,** Electric Braking of DC series & shunt motors.

Text books:

1. **Nagrath I.J** and **Kothari D P,** McGraw Hill "Electric Machines", Tata (1985).
2. **Chapman S.J**, "Electric Machinery Fundamentals", McGraw Hill (1983).

Reference books:

1. **Puchstein A F, Lloyds T C** and **Conard A C**, "Alternating Current Machines", Asia Publishing House (1968).
2. **Bimbhra P S** and **Khanna,** "Electrical Machinery", Publishers, Delhi, 6th Ed. (4003)

Note for Paper Setter: The Question Paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt 5 questions at least one from each unit.

Semester III

Course Title: Signals & Systems **Max Marks: 100**
Course Code: ERE-324 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this course is to study and analyze the characteristics of continuous, discrete signals and systems**.**

Unit-I

Introduction: Definitions of a signal and a system, classification of signals, basic Operations on signals, elementary signals, Systems viewed as Interconnections of operations, properties of systems. Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, effect of under sampling – Aliasing

Unit-II

Time-domain representations for LTI systems–1: Convolution, impulse response representation, Convolution Sum and Convolution Integral. Properties of impulse response representation, Block diagram representations.

Unit-III

Fourier representation for signals–1: Fourier representation for signals –: Discrete and continuous Fourier transforms (derivations of transforms are excluded) and their properties. Applications of Fourier representations**:** Introduction, Frequency response of LTI systems, Fourier transform representation of periodic signals, Fourier transform representation of discrete time signals

Unit-IV

Laplace Transforms–1: Introduction, Laplace transform, properties of ROC, properties of Laplace transforms, inversion of Laplace transforms. Transform analysis of LTI Systems, unilateral Laplace Transform and its application to solve differential equations and analysis of electric circuits.

Unit-V

The Z Transform: Z-Transform, Region of convergence; Properties of the Z-transform; inversion of Laplace transforms. Transform analysis of LTI Systems, Unilateral Z-transform and its application to difference equations with non-zero initial condition.

Text Books:

1. **Simon Haykin and Barry Van Veen** "Signals and Systems", John Wiley & Sons, 2001.Reprint 2002.
2. **B. P. Lathi,** "Linear Systems and Signals", Oxford University Press, 2005.

Reference Books:

1. **V. Oppenheim Alan, S. Alan, Willsky & Nawab Hamid A.,** Signals and Systems, PHI, 2nd Ed., 1998
2. **H. P Hsu, R. Ranjan,** "Signals and Systems", Scham's outlines, TMH, 2006.
3. **Ganesh Rao and Satish Tunga,** Signals and Systems, Sanguine Technical Publishers, 2004.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit. The student has to attempt five questions at least one question from each unit.

Semester III

Course Title: Digital Electronics **Max Marks: 100**
Course Code: ERE-325 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this subject is to enable the students to know basic concepts of digital electronics design and build digital hardware.

Unit-I

Review of number systems, BCD, Excess-3, Gray and Alphanumeric codes. Review of Boolean algebra, De-Morgan's Theorems, Standard Forms of Boolean Expressions, Minimization-Techniques: K-MAPS, VEM Technique, Q-M (Tabulation) method.

Unit-II

Logic Gates & families: TTL, MOS, CMOS, Bi-CMOS; Performance parameters of IC families: input and output loading, fan-in, fan-out, tri-state, current drive, voltage levels, noise margins, power-speed tradeoff; Unused inputs; Interfacing between logic families.

Unit-III

Combinational Logic Circuits: Problem formulation and design of Basic Combinational Logic Circuits, Combinational Logic Using Universal Gates. Basic Adders, ALU, Parity-Checkers and Generators, Comparators, Decoders, Encoders, Code Converters, Multiplexer (Data Selector), De-multiplexers

Unit-IV

Sequential Circuits: Latches, Flip-flops (SR, JK, T, D, Master/Slave FF,) Edge-Triggered Flip-Flops, Flip-Flop Operating Characteristics, Basic Flip-Flop Applications, Asynchronous Counter Operation, Synchronous Counter Operation, Up/Down Synchronous Counters.

Unit-V

Shift registers & Memories, Shift Register Functions, Serial In - Serial Out Shift Registers, Serial In - Parallel Out Shift Registers, Parallel In - Serial Out Shift Registers, Parallel In - Parallel Out Shift Registers, Bidirectional Shift Registers, Basics of Semiconductor Memories, Random-Access Memories (ROM), Read Only Memories (ROMs), Programmable ROM's (PROMs and EPROM's), PAL, PLA.

Text Books:

1. **Morris Mano**, Digital Logic Design, TMH.
2. **Kumar Anand**, Digital Logic Design, PHI.

Reference Books:

3. **Thomas L. F.**, Digital Fundamentals, Prentice Hall, Inc, 4th Edition 1998.
4. **Tocci R. J.** & **Widner**, Digital Systems: Principles and Applications, PHI.
5. **Gothman**, Fundamentals of Digital Electronics, PHI.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.

SEMISTER III

Course Title: Applied Electronics **Max Marks: 100**
Course Code: ERE-326 **University Exam: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The course is designed to introduce the students with advance electronic circuits and applications in fabrications of various devices

Unit-I

Introduction: Definitions of a signal and a system, classification of signals, basic Operations on signals, elementary signals, Systems viewed as Interconnections of operations, properties of systems.

Unit-II

Time-domain representations for LTI systems–1: Convolution, impulse response representation, Convolution Sum and Convolution Integral. Properties of impulse response representation.

Unit-III

Fourier representation for signals–1: Fourier representation for signals –: Discrete and continuous Fourier transforms (derivations of transforms are excluded) and their properties. Frequency response of LTI systems, Fourier transform representation of periodic signals, Fourier transform representation of discrete time signals

Unit-IV

Laplace Transforms–1: Introduction, Laplace transform, properties of ROC, properties of Laplace transforms, inversion of Laplace transforms. Transform analysis of LTI Systems, unilateral Laplace Transform and its application to solve differential equations. Block diagram representation in S-Domain.

Unit-V

The Z Transform: Z-Transform, Region of convergence; Properties of the Z-transform; inversion of Laplace transforms. Transform analysis of LTI Systems, Unilateral Z-transform and its application to difference equations with zero and non-zero initial condition. Block diagram representation in Z-Domain.

Text Books:

1. **Millman** & **Halkias,** Integrated devices & circuits ",by TMH.
2. **Ramakant A. Gayakwad** OpAmps and Linear Integrated Circuits**",** 4th edn, PHI

Reference Books:

1. **David A. Bell**, Operational Amplifiers and Linear IC's**",** , 2nd edition, PHI, 4004.
2. **T. L. Floyd**, Electronic Devices by Pearson Education.

Note for paper setter:-The Question paper shall comprise of 10 questions. Two questions will be set from each unit .The student has to attempt five questions at least one from each unit.

Semester III

Course Title: Electrical Machines-I Lab **Max Marks: 50**
Course Code: ERE-331 **University Exam:25**
Duration of Exam: 3 hours **Internal Assessment: 25**

1. To perform Ratio, Polarity and the Load Test on a Single Phase Transformer.
2. To perform Open Circuit and Short Circuit Test on a Single Phase Transformer and hence determine its Equivalent Circuit Parameters.
3. To perform Parallel Operation on two Single Phase Transformers.
4. To perform polarity test on three phase Transformers and connect them in various combinations of star and delta
5. Speed Control of a DC Shunt Motor
6. To obtain Magnetization characteristics of
   a) a separately excited DC Generator
   b) a Shunt Generator
7. To obtain the load characteristics of
   a) a DC Shunt Motor
   b) a DC Cumulative Compound Generator
8. To perform load test of Dc series motor .

Note: These are only the suggested list of practicals. Instructor may add or change some practicals relevant to the course contents.

Semester III

Course Title: Digital Electronics Lab **Max Marks: 50**
Course Code: ERE-332 **University Exam:25**
Duration of Exam: 3 hours **Internal Assessment: 25**

List of Experiments:

1. Study of pin diagram of various ICs and to test the logic gates and verify their truth tables.
2. Implementation of following with Logic Gates.
    a. Half Adder.
    b. Full Adder.
    c. Half Subtractor.
    d. Full Subtractor.
3. Implementation of Boolean functions using 84153 4:1 MUX
4. Implementation of De-multiplexer, Decoder and Encoder.
5. To add two 4 bit binary numbers using IC 8483.
6. To verify the operation of different modes of shift register using IC 8495.
7. Design of BCD to 8 segment display using logical gates.
8. Simulations
    8.1. Introduction to circuit maker and electronic work bench.
    8.2. Implementation of experiments from Serial No. 1 to 8 through simulations.

Note: This is only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

Semester III

Course Title: Applied Electronics Lab **Max Marks: 50**
Course Code: ERE-333 **University Exam:25**
Duration of Exam: 3 hours **Internal Assessment: 25**

1. To study bipolar transistor as a switch.
2. To plot a load line for a CE amplifier and show effect of input signal on Q-point.
3. To demonstrate use of a BJT in a CE amplifier circuit configuration and study its frequency response.
4. To study the characteristics of Class- AB amplifier.
5. To study the characteristics of Class- B push-pull amplifier.
6. Study of OP AMPs – IC 841, IC 555, – Functioning, Parameters and Specifications.
7. To demonstrate the relationship between input and output for the inverting and non-inverting configuration of the Op-Amp 841
8. To perform the Application operation – Adder, Subtractor, Comparator Circuits using IC 841.
9. To design a square wave and triangular wave generator using Op-amp's.
10. Active Filter Applications – LPF, HPF (first order & 2^{nd} order)
11. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
12. IC 555 Timer – Monostable Operation Circuit.
13. IC 555 Timer – Astable Operation Circuit.
14. Schmitt Trigger Circuits – using IC 841 and IC 555.

Note: These are only the suggested list of practicals. Instructor may add or change some practicals relevant to the course contents