SYLLABUS

FOR

B.TECH. PROGRAMME

CIVIL ENGINEERING
ELECTRICAL ENGINEERING
MECHANICAL ENGINEERING

(First Year)

UNIVERSITY OF KASHMIR
SRINAGAR

DECEMBER – 2020
(Applicable to Batch 2020 & Onwards)
COURSE STRUCTURE

B.TECH. 2nd SEMESTER

Course Code	Course Title	Teaching Periods Per Week			Credits
		L	T	P	
MTH20201	Engineering Mathematics – II	3	0	0	3
ELE20202	Principles of Electrical Engineering	2	1	0	3
ECE20203	Fundamentals of Electronics Engineering	2	1	0	3
CHM20204	Environmental Science	2	1	0	3
MEC20205	Computer Aided Drawing	2	0	2	3
MEC20206	Engineering Mechanics	2	0	2	3
ELE20202L	Principles of Electrical Engineering Lab	0	0	2	1
ECE20203L	Fundamentals of Electronics Engineering Lab	0	0	2	1
MEC20207B	Workshop Practice B	0	0	4	2
Total		13	3	12	22

SECOND SEMESTER B.TECH.

(Civil, Electrical, Mechanical)

University of Kashmir Zakura Campus

Course Code	MTH20201		Semester		Second
Category	Basic Science Course				
Course Title	Engineering Mathematics II				
Scheme & Credits	L	T	P	Credits	Max Marks: 100
	3	0	0	3	
Prerequisites	Nil				

Course Objectives:

1. Familiarize the prospective engineers with techniques incalculus, multivariate analysis and linear algebra.
2. Aims to equip the students with standard concepts and tools at an intermediate to advanced level.
3. Be able to tackle more advanced level of mathematics and applications that they would find useful in their disciplines.

Unit	Topics	No. of Hours
I	**Ordinary and linear Differential Equations:** Order and degree of a differential equation. Formation of ordinary differential equations, Solution of first order differential equations by separation of variables, Homogeneous differential equations, Equations reducible to Homogeneous, linear differential equations, Equations reducible to linear differential equations. Exact differential equations, Equations reducible to exact form by integrating factors. Linear differential equations with constant coefficients	10
II	**Partial Differential Equations:** Definitions of linear and nonlinear partial differential equations, Order and degree, Formation of PDE'S by eliminating arbitrary constants and arbitrary functions, Classification of partial differential equations, Lagrange's equation , solution of first order linear partial differential equations, Nonlinear partial differential equations, General method of solving partial differential equations (Charpit's method), Four standard forms of nonlinear equations, Solution of wave and heart equations by Separation of variable method.	10
III	**Improper integrals:** Beta Function, Evaluation of Beta Function, Transformation of Beta Function, Properties of Beta Function, Gamma Function, Transformation of Gamma Function, Relationships between Beta and Gamma Functions. Applications of Beta and Gama functions.	10
IV	**Multiple Integrals:** Double integrals over rectangular regions, Double Integrals over General regions, Double integrals in polar coordinates, Triple integrals, Triple integrals in cylindrical and	9

	spherical coordinates, Integrals for mass calculations, Change of Variables in multiple integrals.	
	Total Number of Hours	**39**

Textbooks:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Advanced Engineering Mathematics	E. Kreyszig	John Wiley, Singapore
2	Differential equations and its applications	H.T.H Piaggio	Orient Longman Limited

References:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Ordinary and Partial Differential Equations	M. D. Raisinghania	S. Chand & Co.
2	Advanced Engineering Mathematics	R.K. Jain and S.R.K Iyengar	Narosa

Course Code	ELE20202	Semester	Second
Category	Basic Engineering Course		
Course Title	Principles of Electrical Engineering		
Scheme & Credits	L	T	P	Credits	Max Marks: 100
	2	1	0	3	
Prerequisites	Nil		

Course Objective:
1. Understand and analyse basic electrical and magnetic circuits.
2. Understand basic types of electrical machines and their operating principles.
3. Measurement principles and basic electrical measurement devices.

Unit	Topics	No. of Hours
I	**Basics of Electrical Circuits**: Review of electric circuit concepts & parameters: Voltage, Current, Electric Potential, Resistance, Conductance, Inductance, Capacitance, Reactance, Impedance. Basic terminologies: Nodes, Junctions, Paths, Loops, Branches. Series and Parallel combinations of circuits parameters. Voltage and Current sources and their transformation.Independent & Dependent Sources. Power and energy relations. Ohm's law & its Validity, Ohmic and non Ohmic conductors. **DC Circuits:** Introduction to D.C. Circuits, Voltage and Current Divider Laws, Kirchhoff's laws (KCL & KVL), Basic analysis of Electrical Circuits. Derivation of Current & Voltage in an Electrical Circuit.	10
II	**AC Circuits:** Introduction to A.C. circuits, Basic terminology and definitions, Parameters, Generation of A.C. Voltage, Applications.Terminologies: EMF, Mean, Average, RMS, Peak, and Form Factor etc. A.C. to D.C. and D.C. to A.C. Conversion, Concept of Single Phase and Three Phase Circuits. Concept about Electricity distribution.	9
III	**Magnetic Circuits**: Basic terminologies: MMF, Reluctance, Permeance, Magnetic field and permeability, Self and Mutual Inductance, leakage flux.Faraday's laws of electromagnetic induction, Lenz's law. Analogy between electric circuit and magnetic circuits, Analysis of series and parallel magnetic circuit, B-H curve, Hysteresis & Eddy current loss. **Electrical Machines**: Introduction to Machinery Principles, Electrical and Mechanical Terminologies associated with Electrical Machines.	10
IV	**Types of Electrical Machines:** Transformers, A.C. and D.C. Generators & Motors. Basic Concepts & Principle of Operation, Losses in Electrical Machines.	10

	Electrical Measurement: Introduction to Electrical Measurement & Measuring Instruments. Measurement Errors, Ammeter, Voltmeter, Wattmeter, Energy Meter.	
	Total Number of Hours	**39**

Textbooks:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Electric Engineering Fundamentals	Vincent Del Toro	PHI
2	Hughes Electrical & Electronic Technology	Hughes	Pearson
3	Fundamentals of Electrical Engineering	Giorgio Rizzoni	McGraw-Hill

References:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Fundamentals of Electric Circuits	Alexander & Sadiku	McGraw-Hill
2	Engineering circuit Analysis	Hayt& Kimberly	McGraw-Hill
3	Introduction to Circuit Analysis & Design	Glisson	Springer
4	Basic Electric Circuit Analysis	Johnson, Hilburn, Johnson	Wiley
5	A course in Electrical & Electronic Measurements & Instruments.	Sawhney A K	Dhanpat Rai

Course Code	ECE20203	Semester	Second
Category	Basic Engineering Course		
Course Title	Fundamentals of Electronics Engineering		
Scheme & Credits	L	T	P	Credits	Max Marks: 100
	2	1	0	3	
Prerequisites	*Nil*		

Course Objectives:
1. To introduce the students to the field of electronics beyond Semiconductors.
2. To familiarize the students with basic electronic circuits, Devices and Systems and train them to understand as well as design simple hardware electronic systems for problem solving.

Unit	Topics	No. of Hours
I	**Review of Basics:** Introduction to Electronics and applications of Electronic systems in real life; Review of basic electronic Circuits, Signals and Electronic Components; Introduction to A.C and D.C. signals; Digital and Analog signals; Review of Semiconductor materials, Energy Bands and Charge carriers. **Semiconductor Diode:** PN-Junction, Forward Bias and Reverse Bias conditions, Ideal-vs-practical diode, I-V characteristics of a PN Junction diode, Shockley equation, Transition and Diffusion Capacitance of a Diode, Reverse Recovery time. Diode models with mathematical formulations and applications. Diode Breakdown, Large signal and Small signal operation of Diode, Load Line analysis for AC inputs of Diode circuits. Clippers, Clampers and Voltage Multipliers.	**10**
II	**Special Diodes and their applications:** Introduction to Zener Diode, Light Emitting Diode (LED), Photo Diode, PIN Diode, Tunnel Diode, Varactor Diodes; Diode applications: Half-Wave Rectification and analysis, Centre-tapped Full-Wave rectification and analysis, Bridge rectifier and its analysis; Workout Voltage Regulator using Zener Diode. **Bipolar Junction Transistors (BJTs):** Physical structure and construction; Transistor Operation; Current components; PNP and NPN Transistors; Biasing requirements; α and β of transistor; Operation Modes (Active, Cut-Off and Saturation), CE, CB and CC configurations; Characteristics of transistor circuits, Q-Point; Transistor as an amplifier, Transistor as a switch.	**10**
III	**Field Effect Transistors and Special Semiconductor Devices:** JFET: Construction and working; MOSFET (Enhancement-type and Depletion-type): Structure and physical Operation, Current-Voltage characteristics, operation of MOSFET circuits, MOSFET as an amplifier, MOSFET as a switch. Introduction and principle of operation of Phototransistor, UJT and SCR. **Electronic Measurements and Instruments:** Generalized	**10**

	performance parameters of instruments: Error, Accuracy, Precision, Sensitivity and Resolution. Principle and Block diagram of Analog and Digital Multimeters, Block Diagram of CRO; Practical measurements using Multimeter and CRO; Introduction to DSO, Function generator and Spectrum Analyzer.		
IV	**Digital Electronics and Applications:** Introduction to Number Systems; Binary Number System; Logic Gates; Operation, Symbol, and Truth Table of AND, OR, NOT, NAND, NOR and X-OR Gates. Design of Half Adder and Full Adder using basic logic Gates. Introduction to Flip-Flops, counters, Shift Registers and Memory Cells. Familiarization with IC based Digital circuits. **Introduction to Microprocessors and Microcontrollers:** Overview of Industrial Applications of Microcontrollers with special reference to Arduino.	9	
	Total Number of Hours	39	

Textbooks:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Fundamentals of Microelectronics	Behzad Razavi	Wiley
2	Electronics Devices and Circuit Theory	R. Boylestad.	Pearson
3	Digital Electronics, Principles, and Integrated Circuits	Anil k Maini	Wiley
4	A course in Electrical & Electronic Measurements & Instruments.	Sawhney A K	Dhanpat Rai

References:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Microelectronic Circuits	Adel S. Sedra and Kenneth C. Smith	Oxford University Press
2	Integrated devices & Circuits	Millman&Halkias	SIE publication
3	Electronics Devices and Circuits-I	A.P.Godse& U.A. Bakshi.	Technical Publications
4	Electronics Devices and Circuits-II	A.P.Godse& U.A. Bakshi.	Technical Publications

Course Code	CHM20204	Semester	Second
Category	Basic Science Course		
Course Title	Environmental Science		
Scheme & Credits	L	T	P	Credits	Max Marks: 100
	2	1	0	3	
Prerequisites	*Nil*		

Course Objectives:
1. Students be able to understand the composition of Environment.
2. Understand Atmosphere & Hydrosphere.
3. Effects & Remedies to Air & Water Pollution.
4. Sustainable development & methods of Energy Management.

Unit	Topics	No. of Hours
I	**Environment and Atmosphere:** Introduction, Segments of Environment; Factors affecting Environment, Composition of Atmosphere: particles, ions, radicals and their formation, Vertical profile of atmosphere, Heat budget of earths atmospheric system, Chemical and photochemical reactions in atmosphere, photochemical smog formation; oxides of C, N, S and their effects, Chemistry of Sun screens, ozone chemistry. **Global effects of Air pollution:** Greenhouse effect and Greenhouse gases (Kyoto protocol), Global warming: causes, impacts of global warming, Climate change, acid rain, ozone layer depletion (Montreal Protocol).	10
II	**Environment and Hydrosphere:** Chemical composition of water bodies: Lakes, ponds and rivers, factors determining composition: Thermal stratification, acid – base and redox property (pE concept), water quality parameters: Dissolved oxygen, Metals, Chloride content, Phosphate, Nitrate and Microorganisms, Water quality standards, Analytical methods for determination of BOD, COD, DO and Metals (Ag, Cd, Hg, Pb and Se), choice of method for determination	10
III	**Water and its Treatment:** Hard water, Types of hardness, units of hardness, methods of estimation, Treatment of hard water/softening of hard water; Lime-Soda process, Zeolite process and Ion Exchange process, Alkalinity of water, determination of alkalinity by using Double indicator method (phenolphthalein and methyl orange indicators), numerical problems based on hardness, alkalinity and LS process, municipal treatment of water for drinking purposes; removal of suspended, dissolved and biological impurities-sterilization by chlorination	10

	(Effective and break-point chlorination).	
IV	**Sustainable Development & Environmental Management:** Energy and Environment: Energy sources – overview of resources and reserves. **Social and economic issues:** Poverty, NC Saxena Panel, Tendulkar Committee, Food security, food security in India, challenges to food security, Sustainable Development: Definition and concepts of sustainable development, International initiatives towards Sustainable development, Sustainable development goals; Hurdles to sustainability. **Environmental Management Systems:** ISO14000 series; Environmental auditing: Environmental Impact Assessment, Life cycle assessment; Human health risk assessment, issues involved in enforcement of environmental legislations **Solid waste Management:** Causes, effects and control measures of urban and industrial wastes. Disaster management: Floods, earthquake, cyclone and landslides	9
	Total Number of Hours	**39**

Textbooks:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Textbook of Environmental studies	ErachBharucha	Orient BlackSwan
2	Fundamental concepts in Environmental Studies	D. D. Mishra	S Chand & Company
3	Environmental chemistry	Nigel J. Bunce	Wuerz Pub.

References:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Environmental Chemistry	Colin Baird	W. H. Freeman
2	Environmental pollution	B.K Sharma & H. Kaur	

Course Code	MEC20205	Semester		Second
Category	Basic Engineering Course			
Course Title	Computer Aided Drawing			
Scheme & Credits	L	T	P	Credits	Max Marks: 100
	2	0	2	3	
Prerequisites	*Nil*			

Unit	Topics	No. of Hours
I	**Introduction to AutoCAD** Prerequisites for CAD, Create a new Drawing, Adding a Drawing, Drawing Properties, Practice on Drawing basics. Geometrical Drawing Practice, Elementary commands, Modifying Elementary Commands, Making layers, Line type & Line weight, Function keys, Shortcut keys, Making Title Block, Creating a new template file, Applying dimensions style.	9
II	**Introduction to Mechanical drawings** Thread forms, Thread terminology, Sectional views of threads. ISO Metric (Internal & External), BSW (Internal and External), Square, Acme and Sellers thread, American Standard thread. Hexagonal headed bolt and nut with washer (assembly), Square headed bolt and nut with washer (assembly), Locking arrangement for nuts, Foundation Bolts. **Riveted joints**: Forms and proportions of rivet heads, Different views of riveted Lap and Butt joints. **Shaft joints:** Cotter joint, Gib and Cotter joint, Knuckle joint, Socket and Spigot joint.	23
III	**Introduction to Civil drawings** Introduction to AutoCAD Civil, Settings and Configurations, views of foundation, stairs, doors and windows, building plan and drawing, floor plan layout.	8
IV	**Introduction to Electrical drawings** Introduction to AutoCAD Electrical, Settings and Configuration, Basic circuit workflow, wires types and components, addition of wire numbers, Managing simple circuits.	12
	Total Number of Hours	52

Textbooks:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Machine Drawing with Auto CAD	Goutam Pohit, Goutam Ghosh	Pearson
2	Beginning Auto CAD	Cherylr. Shrock, Steve	Industrial Press

3	Up and Running with AutoCAD 2019 2D Drafting and Design	Heather Elliot J. Gindis, Robert C. Kaebisch	Academic Press
4	Auto CAD Electrical 2016	Sham Tickoo	CADCIM Technologies

References:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Engineering Graphics with AutoCAD	Bethune, J.,	Peachpit Press
2	Up and Running with 2D & 3D Drawing and Modelling	Elliot Gindis	Academic Press
3	Machine Drawing	P.S.Gill	Katria and Sons

Course Code	MEC20206	*Semester*	*Second*
Category	Basic Engineering Course		
Course Title	Engineering Mechanics		
Scheme &	L	T	P	Credits	Max Marks: 100
Credits	2	0	2	3	
Prerequisites	*Nil*		

Course Objectives:

1. Provide an introductory treatment of Engineering Mechanics to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters.
2. Providing a working knowledge of statics with emphasis on force equilibrium and free body diagrams.
3. Provide an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems, and an understanding of the mechanical behaviour of materials under various load conditions.

Unit	Topics	No. of Hours
I	Basic concepts of Vectors, System of Forces, CoplanarConcurrent Forces, rigid body equations, Components in Space – Resultant- Moment of Forces and its Application; Moment about a specific axis, Equilibrium of System of Forces, Free body diagrams, simplification of force moment system. Centroid and Centre of Gravity, Centroid of simple figures and centroid of composite sections,	13
II	Centre of Gravity and its implications; Area moment of inertia, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of solids, product of inertia. Friction, Types of friction,	13
III	Analysis of screw jack & differential screw jack. Basic Structural Analysis of trusses, Method of Sections; Method of Joints; Zero force members; Beams & types of beams (SF & BMD); Frames & Machines.	13
IV	Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies. Conservative Forces, Potential-Energy Criterion for Equilibrium, Stability of Equilibrium Configuration, Applications of energy method for equilibrium. Stability of equilibrium.	13
	Total Number of Hours	**52**

Textbooks:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Engineering Mechanics.	Shames and Rao	Pearson Education
2	Engineering Mechanics (Statics)	Hibler and Gupta	Pearson Education

References:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Vector Mechanics for Engineers (Statics)	Ferdinand P. Beer & R. Johnston	MC. Graw Hill
2	Engineering Mechanics (Statics)	J. L. Meriam & L. G. Kraige	John Willey

Course Code	ELE20202L	Semester	Second
Category	Basic Engineering Course		
Course Title	Principles of Electrical Engineering Lab		
Scheme & Credits	L T P Credits		Max Marks: 100
	0 0 2 1		
Prerequisites	Nil		

S. No.	Experiment
1.	Basic safety precautions. Introduction and use of measuring instruments – Voltmeter, Ammeter, Multi-meter, Oscilloscope.
2.	Resistors, Capacitors & Inductors.
3.	To study the colour coding of Resistors
4.	Different Electric Wiring Techniques
5.	Necessity & Demonstration of earthing & fuse
6.	Use of LCRQ meter.
7.	To study the series & parallel operation of resistors, capacitors & inductors and verifying their effective values by LCRQ meter.
8.	To verify the KVL and KCL in DC circuits.
9.	To verify the star delta transformation of networks.
10.	Basic R, L, C circuits excited from A.C
11.	To measure electric power in single-phase AC circuits with resistive load, RL load and RLC load.
12.	Demonstration of cut section of various electrical machines.

Course Code	ECE20203L	Semester	Second
Category	Basic Engineering Course		
Course Title	Fundamentals of Electronics Engineering Lab		
Scheme & Credits	L	T	P	Credits	Max Marks: 100
	0	0	2	1	
Prerequisites	Nil		

S. No.	Experiment
1.	Characterize various commercial diodes based on voltage and current ratings. Study/ Simulation of their I-V characteristics using Multisim /p-spice.
2.	Characterize various commercial Zener diodes based on voltage and current ratings, Study/simulation of I-V characteristics of Zener diode
3.	Study of I-V characteristics of a light emitting diode. Design of current limiting resistors for different input voltages.
4.	To assemble/simulate a half wave rectifier using power diodes and LEDs and study their performance
5.	To assemble/simulate a centre tapped full wave rectifier using power diodes and LEDs and study their performance
6.	To assemble/simulate a bridge wave rectifier using power diodes and LEDs and study their Performance
7.	Study/simulation of diode applications like clippers, clampers, protection circuits.
8.	Study of Zener diodes as voltage regulators.
9.	Design of an IC based voltage regulator.
10.	Study I-V characteristics of transistor (PNP and NPN). Calculate the performance parameters of BJT.
11.	Use NPN BJT transistor as an inverter switch.
12.	Characteristics of JFET in common source configuration
13.	Logic characterization of various basic logic gates like AND, NAND, NOT, OR, NOR, XOR and Buffer
14.	Logic characterization of basic combinational circuits like decoders and adders
15.	Logic characterization of basic sequential circuits like D-flipflop, JK-flipflop and T-flipflop

Course Code	MEC20207B	Semester		Second
Category	Basic Engineering Course			
Course Title	Workshop Practice B			
Scheme &	L	T	P	Credits	Max Marks: 100
Credits	0	0	4	2	
Prerequisites	*Nil*				

Course Objective:

At the end of the course, the student will be able to:

1. Select suitable technique for MECting a specific fabrication need.
2. Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design & fabricate small components for their project work and to participate in various national and international technical competitions.
3. Have good practical exposure to different fabrication techniques.
4. Create of simple components using different materials.

Unit	Topics	No. of Hours
I	**Machine Section** Safety precautions, introduction to various Machining and metal cutting Processes, Various cutting tools, Demonstration of knurling, thread cutting, boring etc. on lathe machine, simple operations on milling, shaper, grinding machines. Aim: To prepare a cylindrical job on lathe for manufacturing of a gear on milling machine.	13
II	**Welding Section** Safety precautions, Different welding processes, Tools and equipments, Making of various joints using gas welding and arc welding (Mig. welding) techniques, Bead formation in various positions. Brazing operations. Aim: To make V-butt joint, out-side corner joint, lap joint and pipe joints.	13
III	**Foundry and Casting section** Safety precautions, introduction to casting processes. Types of patterns, Risers, runners, allowances, gates, moldings, Casting defects, Demonstration and practice of mould making with the use of split patterns and cores, Sand preparation and testing, Casting practice of various materials like brass, aluminum, waxes etc. by using different types of patterns. Aim: To prepare a Green sand mould by using, single piece pattern and split pattern casting,	13
IV	**Electronic Section** Safety precautions, Familiarization of tools and instruments used for electronic equipment repair works, Familiarization with Breadboard, IC types, pin number, testing with multi-meter etc. Soldering and de-soldering: Various equipment, tools and practices. Identify different types of	13

	soldering &desolderingguns and practice soldering of different electronic components, Aim: Construct and test simple amplifier circuits **Electrical Section** Safety precautions, Familiarization of tools and instruments used for electrical repair works, Dis-Assembly of various testing meters, electrical machines like iron box, transformer, motor, induction heater etc., measurement of gauge and diameter of conductor, armature used in winding work.	
Total Number of Hours		**52**

Textbooks:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Workshop Technology Vol. I	Chapman	CBS
2	Workshop Technology Vol. II	Hajra Chowdhary	

References:

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Workshop Technology Vol. I	Swarn Singh	S.K. Kataria& Sons
2	Workshop Technology Vol. I	Virender Narula	S.K. Kataria& Sons