

UNIVERSITY OF JAMMU

(NAAC ACCREDITED A + GRADE UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

NOTIFICATION (22/Nov/Adp/ 71)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Competent Bodies, has been pleased to authorize the adoption of the revised Syllabi and Courses of Studies in **Bachelor of Engineering (Civil Engineering)** for Semester I & II under the **Credit Based System** as per the model curriculum of the AICTE (as given in the Annexure) for the candidates of (Govt./Pvt.) Engineering Colleges affiliated with the University of Jammu for the Examinations to be held in the years indicated against each Semester as under:-

Branch	Semester	For the Examination to be held in the years
Civil	Semester-I	December 2022, 2023, 2024 and 2025
	Semester-II	May 2023, 2024, 2025 and 2026

The Syllabi of the course is available on the University Website: www.jammuniversity.ac.in.

Sd/-
DEAN ACADEMIC AFFAIRS

No. F.Acd/III/22/9958-9966

Dated: 22/11/2022

Copy for information & necessary action to:-

1. Dean Faculty of Engineering
2. Principal, GCET/MBSCET/BCET/YCET
3. C.A to the Controller of Examinations
4. Deputy Assistant Registrar (Exams/Confidential)
5. Incharge University Website

Sumitasharma
Deputy Registrar (Academic) 22/11/22

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UNIVERSITY OF JAMMU, JAMMU

COURSE SCHEME

B.E Ist Semester Civil Engineering

For Examination to be held in the Year December 2022,2023,2024,2025.

Contact hours/week = 25

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL MARKS	CREDITS	% CHANGE
			L	T	P	Internal	External			
BST1101	Basic Science Course	Engineering Mathematics-I	2	1	0	50	100	150	3	100%
BST1102	Basic Science Course	Applied Engineering Chemistry	2	1	0	50	100	150	3	100%
CET6101	Engineering Science Course	Energy and Environment	2	1	0	50	100	150	3	100%
CET6102	Professional Core Course	Structural Analysis- I	2	1	0	50	100	150	3	100%
EET2101	Engineering Science Course	Principles of Electrical Engineering	2	1	0	50	100	150	3	100%
HMT1101	Humanities & Management Course	Technical Communication skills	2	0	0	25	75	100	2	100%
BSP1112	Basic Science Course	Applied Engineering Chemistry Lab	0	0	2	50	-	50	1	100%
CEP6112	Professional Core Course	Structural Analysis- I Lab	0	0	2	50	-	50	1	100%
EEP2111	Engineering Science Course	Principles of Electrical Engineering Lab	0	0	2	50	0	50	1	100%
HMP1111	Humanities & Management Course	Technical Communication skills lab	0	0	2	50	-	50	1	100%
Total			12	5	8	475	575	1050	21	







For Examination to be held in the Year December 2022, 2023, 2024, 2025

CLASS	1st SEMESTER					
BRANCH	COMMON TO ALL BRANCHES					
COURSE TITLE	ENGINEERING MATHEMATICS - I					
COURSE TYPE	BASIC SCIENCE COURSE					
COURSE NO.	BST1101	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

Course Outcomes: At the end of the course the students will be able to:	
CO1	Learn general theorems of calculus; find maximum and minimum value of functions of two variables.
CO2	Understand the concept of definite integrals.
CO3	Learn basics of complex trigonometry.
CO4	Find the rank, eigen values/ vectors of matrices.

SECTION - A

UNIT-I: DIFFERENTIAL CALCULUS

Partial differentiation, Euler's theorem on homogeneous functions, Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's series with remainder, Taylor's series in two variables, Maxima and Minima of functions of two variables, Method of Lagrange's multipliers. (12 hours)

UNIT-II: INTEGRAL CALCULUS

Definite integrals with important properties, differentiation under the integral sign, Gamma, Beta and error functions with simple problems, double and triple integrals with simple problems (8 hours)

SECTION - B

UNIT-III: COMPLEX TRIGONOMETRY

Hyperbolic functions of a complex variable, Inverse Hyperbolic functions, Logarithmic function of a complex variable; Summation of series by C+iS method. (8 hours)

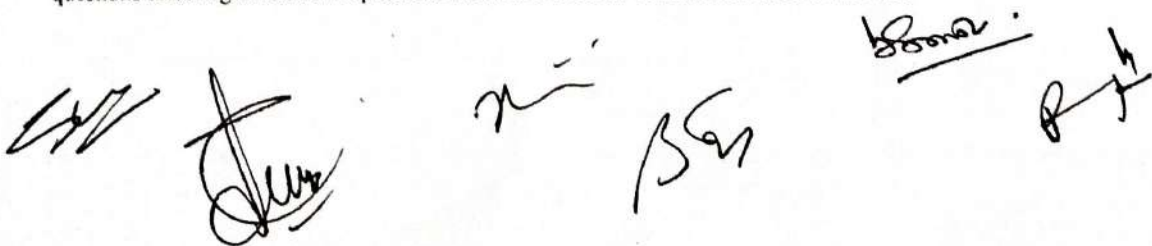
UNIT-IV: MATRICES

Introduction, Rank of a matrix, Elementary transformations, Elementary matrices, Inverse using elementary transformation, Normal form of a matrix, Eigen values and Eigen vector, Properties of Eigen value, Cayley Hamilton Theorem, Diagonalization of matrix. (14-hours)

RECOMMENDED BOOKS:

Calculus and Analytic Geometry	Thomas and Finney
Differential Calculus	S. Narayan and P.K. Mittal
Higher Engineering Mathematics	B.S Grewal
Engineering Mathematics-I	Dr. Bhopinder Singh
Engineering Mathematics-II	Dr. Bhopinder Singh

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.



For Examination to be held in the Year December 2022, 2023, 2024, 2025.

CLASS	1st SEMESTER					
BRANCH	CIVIL/ MECHANICAL ENGINEERING					
COURSE TITLE	APPLIED ENGINEERING CHEMISTRY					
COURSE TYPE	BASIC SCIENCE COURSE					
COURSE NO.	BST1102	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

COURSE OUTCOMES: On completion of the course the students will be able to:	
CO1	Know the importance of green chemistry and apply the knowledge of Drugs in day to day life.
CO2	Summarize the different types, preparation and uses of explosives and the importance of nano particles.
CO3	Acquire Knowledge about the identification of newly synthesized products through Spectroscopy
CO4	Get acquainted with the basic knowledge of various Electrochemical Cells, metallic corrosion.
CO5	Get acquainted with the various chemical Processes encountered in the water softening and the impact of lubrication in machinery.

SECTION – A

Unit I

GREEN CHEMISTRY, FUEL AND DRUGS

Green Chemistry : Definition & need of Green Chemistry, Principles and Applications of Green Chemistry.

Fuels: Characteristics of a good Fuel, calorific value & types of Fuels

Drugs: Definition, structure and applications of following drugs: -

(a) Tranquilizers (b) Antibiotics

(08 hrs)

Unit – II

NANO CHEMISTRY AND EXPLOSIVES

Nano Chemistry: Introduction and properties of nano particles, nano materials- Graphene and Fullerenes.

Explosives:- Definition and classification, preparation and uses of TNT and RDX .

(06 hrs)

Unit – III

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

UV Spectroscopy: Principle, Band nature of UV Spectrum, types of electronic transitions and applications.

IR Spectroscopy: Principle, molecular vibrations and applications.

NMR Spectroscopy: Principle, shielding and de-shielding, equivalent and non-equivalent protons, chemical shift and applications of NMR.

(08 hrs)

SECTION – B

Unit – IV

MATERIAL SCIENCE

Material Science: Types Properties & importance of materials: Metals, Semiconductors & Insulators.

Electrochemistry: Introduction to Electrolysis & Faraday's laws, Electrochemical cells; galvanic cell its applications, Mass transfer by electroplating and diffusion.

Corrosion: Dry and wet corrosion, factors influencing rate of corrosion, Remedial Measures against corrosion –cathodic protection, Protective Coatings- galvanizing.

(10 hrs)

Unit – V

WATER TREATMENT AND LUBRICANTS

Water Treatment: Introduction, softening of water by Zeolite & ion-exchange processes, priming and foaming, sludge & scale formation, determination of hardness of water by EDTA method, Numerical on hardness and softening of water.

Lubricants : Classification, mechanism and importance of lubricants.

(10 hrs)

RECOMMENDED BOOKS:

- | | |
|---|---------------------|
| 1. Engineering Chemistry | Sharma, B.K. |
| 2. Material Science and Engineering | William Callister |
| 3. An introduction to nano materials and nano science | A.K Das & Mahua Das |
| 4. Spectroscopy of Organic Compounds | Silverstein |

REFERENCE BOOKS:

- | | |
|--------------------------------------|------------------|
| 1. Engineering Chemistry | Shashi, Chawla |
| 2. Spectroscopy of Organic Compounds | Silverstein |
| 3. Electrochemistry | Samuel Glasstone |

NOTE: There shall be a total of eight questions 20 marks each, four from each section. Students are required to attempt Five questions, selecting at least two questions from each section. Use of calculator is allowed.

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For Examination to be held in the Year December 2022, 2023, 2024, 2025

CLASS	1st SEMESTER					
BRANCH	CIVIL/ECE ENGINEERING					
COURSE TITLE	ENERGY AND ENVIRONMENT					
COURSE TYPE	ENGINEERING SCIENCE COURSE					
COURSE NO.	CET6101	L	T		Marks	
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

COURSE OUTCOMES: On completion of the course the students will be able to	
CO1	Understand the eco-systems, biodiversity and its conservation.
CO2	Understand the basic concepts of environmental studies and natural resources.
CO3	Gain knowledge about different types of environmental pollutions and their control measures.
CO4	Understand the fundamentals of social issues, population and the environment.

SECTION-A

Environment: Introduction, Multidisciplinary nature of environmental studies- Definition, scope and importance, Need for public awareness. **Ecosystem:** Concept, Energy flow, Structure and function of an ecosystem. Food chains, food webs and ecological pyramids, Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems.

(10 hrs)

Natural Resources: Renewable and Non-renewable resources. Different types of resources.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems.

(10 hrs)

SECTION-B

Pollution: Definition, Cause, effects and control measures.

Air pollution- Sources, effects, control, air quality standards, air pollution act, air pollution measurement.

Water Pollution-Sources and impacts, **Soil Pollution-**Sources and impacts, disposal of solid waste. **Greenhouse gases – effect,** acid rain. **Noise pollution-** Definition, Cause, effects and control measures.

(10 hrs)

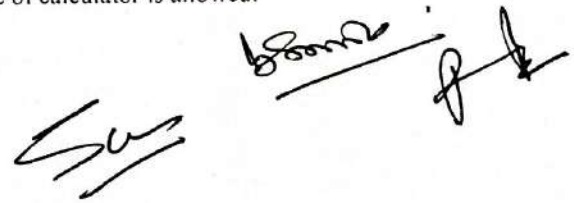
Social Issues and the Environment: Sustainable development and Sustainable use of Resources, Urban problems related to energy, **Energy resources:** Growing energy needs, renewable and nonrenewable energy sources use of alternate energy sources, **Land resources:** Land as a resource, land degradation, soil erosion and desertification, Role of an individual in conservation of natural resources. **Environment Protection Acts:** Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act and Forest Conservation Act.

(10 hrs)

RECOMMENDED BOOKS:

- | | | |
|---|---|-------------------------------|
| 1 | Environmental Engineering | Peavy, Rowe And Tchobanoglous |
| 2 | Elements of Environmental Science And Engineering | P. Meenakshi |
| 3 | Environmental Studies | Kaushik And Kaushik |
| 4 | A Basic Course In Environmental Studies | Deswal And Deswal |

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.



For Examination to be held in the Year December 2022, 2023, 2024, 2025

CLASS	1st SEMESTER					
BRANCH	CIVIL ENGINEERING					
COURSE TITLE	STRUCTURAL ANALYSIS – I					
COURSE TYPE	PROFESSIONAL CORE COURSE					
COURSE NO.	CET6102	L	T	Theory	Marks	Credit
DURATION OF EXAM	3 HOURS	2	1	100	50	3

COURSE OUTCOMES : At the end of this course, students will demonstrate the ability :	
CO1	To determine the resultants in Planar force systems associated with static frame work.
CO2	To calculate the center of gravity, moment of inertia and forces in members of plane trusses.
CO3	To determine the resultants in planar force systems using energy principles.
CO4	To evaluate stress, strain, their relationship and the stresses due to different types of loading.

SECTION – A

Unit 1

STATICS: Introduction, engineering and S.I. units, accuracy in engineering calculations, Vectors composition and resolution, concept of Rigid Body.

Resultant of a force system: i) Concurrent Coplanar Force System

ii) Non concurrent Coplanar Force System : (a) parallel and (b) non parallel Using analytical as well as graphical methods.

iii) Simple cases of concurrent force system in space.

Concept of internal force, free body diagram. Equilibrium of force system listed above.

Unit 2

Properties of plane surfaces: First moment of area, centroid, second moment of area etc

Plane trusses: Forces in members of a truss by method of joints and method of sections

(20 hrs)

SECTION-B

Unit 3

Virtual Work: Principle of Virtual Work and its application.

Types of Beams, Types of Supports, Support Reaction for statically determinate beams.

Dynamics of Rigid Bodies: Newton's Laws, D'Alembert's Principle, Energy Principles

Unit 4

Simple stress and strain: Stress, strain, Stress-strain diagrams, Hooke's law, Modulus of elasticity (E), Lateral strains, Poisson's ratio, Volumetric strain, Bulk modulus (K), Shear stress concept, Modulus of rigidity (G). Relation between E, G and K.

Strain Energy: Strain energy, stresses due to different types of loading- sudden loading, gradually applied loads, impact loads.

(18hrs)

RECOMMENDED BOOKS:

1	Engineering Mechanics	Beer and Johnson
2	Engineering Mechanics	A.K. Tayal
3	Engineering Mechanics	R.C Hibbeler
4	Strength of Materials	S. Ramamutham
5	Mechanics of Materials	R.C Hibbeler

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.

For Examination to be held in the Year December 2022, 2023, 2024, 2025

CLASS	1st SEMESTER					
BRANCH	CIVIL/ELECTRICAL ENGINEERING					
COURSE TITLE	PRINCIPLES OF ELECTRICAL ENGINEERING					
COURSE TYPE	ENGINEERING SCIENCE COURSE					
COURSE NO.	EET2101	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

COURSE OUTCOMES : At the end of this course, students will be able to understand and analyse	
CO1	The basic concepts of electric circuit terminology, Kirchhoff's and Ohm's laws.
CO2	The circuits using the Electrical theorems.
CO3	The basic terminologies in AC and Star-Delta circuits.
CO4	The working principle of single phase transformer.

SECTION – A

Unit- 1

Electric Circuit Laws & Energy Sources: Basic electric circuit terminology, Ohm's law, Kirchhoff's laws, Circuit parameters (Resistance, inductance & capacitance), series & parallel combination of resistance, inductance & capacitance. ideal & practical voltage and current sources and their transformation, dependent voltage sources and dependent current sources. (8 hours)

Unit-2

D.C. Circuit Analysis: Power and energy relations, analysis of series parallel D.C. circuits, Mesh & Nodal methods, Star- Delta transformation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem. Reciprocity Theorem (10 hours)

SECTION – B

Unit-3

A.C. Circuit: Introduction, Average and effective values of periodic functions, instantaneous and average power, Phasor and complex number representation. Solution of sinusoidally excited R, L, C circuits, Resonance in series and parallel circuits, quality factor. Concept of 3-phase voltage and current in Wye (y), Delta circuits and their relationship. (10 hours)

Unit-4

Transformers

Construction, principle operation of single phase transformer, ideal and practical transformer (no-load & on-load phasor diagrams), equivalent circuit, losses in transformers, transformer test (open circuit & short circuit), regulation and efficiency, auto transformer. (8 hours)

RECOMMENDED BOOKS:

1	Electrical Engineering Fundamentals	V. Del Toro
2	Electrical Technology	H. Cotton
3	Electrical Technology	E. Hughes
4	Basic Electrical Engineering	A.K Chakrabarti
5	Basic Electrical Engineering	J.B Gupta

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.



For Examination to be held in the Year December 2022, 2023, 2024, 2025

CLASS	1st SEMESTER					
BRANCH	CIVIL/MECHANICAL ENGINEERING					
COURSE TITLE	TECHNICAL COMMUNICATION SKILLS					
COURSE TYPE	HUMANITIES & MANAGEMENT COURSE					
COURSE NO.	HMT1101	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	0	Theory	Sessional	Credit
				75	25	2

COURSE OUTCOMES : At the end of this course, students will able to :	
CO1	Acquire proficiency in reading, writing, speaking and listening skills.
CO2	Equip themselves with grammatical and communicative competence.
CO3	To help them to develop positive attitude and personality to deal with the complexities of life.
CO4	To encourage the all-round development of students by focusing on soft skills.

SECTION-A

UNIT-1: Communication skills & writing practice: Introduction, Elements of Business Communication, Media of Verbal Communication (oral & written), Barriers to Communication, Technology-Enabled Business Communication, **Types of letter-** Inquiry letter, Reply to Inquiry, Claims Letter, Adjustment and Sales Letter, Job Letter . (08 hrs)

UNIT-2: Listening skills: Process of Listening, Types of listening, Techniques to improve listening ability, **Group Discussion-** Advantages, Purpose, Group Dynamics, and Guidelines for Effective Group discussion. **Speaking Skills-** Skills of Effective speaking, Tips for writing Scripts and Speeches. (07 hrs)

SECTION-B

UNIT-3: Personality Development–Introduction, Importance of Personality Development, Personality Development tips, Different types of Personality, Personality Traits, Personality Disorder, Personality traits of a Good Manager. (08 hrs)

UNIT-4: Life Management Skills: Introduction, Need and importance of Life Management Skills, Concept of Hard and Soft skills; Difference between Hard and Soft Skills, **Interviews-** Meaning, Types of Interview, tips for giving an Interview and handling questions. (07hrs)

RECOMMENDEDBOOKS:

- | | | |
|---|--|----------------------------|
| 1 | Communication Skills Skills (Second Edition) | Sanjay Kumar & Pushap Lata |
| 2 | Functional Aspects of Communication Skills | Dr. Prajapati Prasad |

REFERENCEBOOKS:

- | | | |
|---|-------------------------------------|-----------------------------|
| 1 | An Approach to Communication Skills | Indrajit Bhattacharya |
| 2 | Communication Skills | Varinder Kumar and Bodh Raj |
| 3 | Master of Life Management | Dr.Dantu Murali Krishna |
| 4 | Personality Development | Kagan Jerome |

NOTE: There shall be total eight questions, four from each section. Each question carries 15 marks. Five questions will have to be attempted, selecting at least two from each section



For Examination to be held in the Year December 2022, 2023, 2024, 2025.

CLASS	1st SEMESTER
BRANCH	CIVIL/MECHANICAL ENGINEERING
COURSE TITLE	APPLIED ENGINEERING CHEMISTRY LAB
COURSE TYPE	BASIC SCIENCE COURSE
COURSE NO.	BSP1112

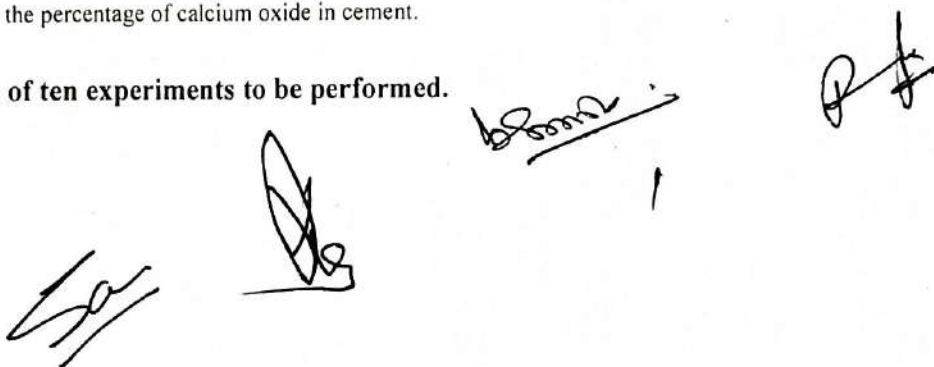
P	Marks	Credit
2	Sessional	1
	50	

COURSE OUTCOMES : At the end of this course, students will able to :	
CO1	Visualize and understand chemical engineering unit, operations related to fluid and practical mechanics and mass transfer.
CO2	Analyse and overview of preparation and identification of organic compound
CO3	Understand the quantitative analysis and makes use of simple equation to illustrate the concept involved.
CO4	Estimation of total hardness of water by EDTA complexometric method.

S. NO. LIST OF EXPERIMENT

1. To determine volumetrically the number of molecules of water of crystallization present in the given sample of Mohr's salt, x gms. of which have been dissolved per litre provided N/10 $K_2Cr_2O_7$ (using an external indicator).
2. To determine volumetrically the percentage of Cu in a sample of $CuSO_4$ crystals, Z gms of which have been dissolved per litre, provided 0.1N $Na_2S_2O_3$.
3. To determine the coefficient of viscosity of an unknown liquid using Ostwald Viscometer.
4. Determine the surface tension of a unknown liquid Stalagmometer.
5. To prepare a pure and dry sample of Aspirin.
6. To prepare a pure and dry sample of Glucosazone.
7. To analyse the given antacid tablets
8. To analyse the trend of absorbance of solution at different concentrations by UV spectrophotometer.
9. Determine the method of purification of organic compounds by paper chromatography.
10. Organic Analysis: Identify the following organic compounds (preparation of at least one derivative).
11. Determine the total hardness of a sample of water by complexometric method (using EDTA).
12. Determine the percentage of calcium oxide in cement.

Note: A minimum of ten experiments to be performed.



For Examination to be held in the Year December 2022, 2023, 2024, 2025.

BRANCH	CIVIL ENGINEERING			
COURSE TITLE	STRUCTURAL ANALYSIS – I LAB			
COURSE TYPE	PROFESSIONAL CORECOURSE			
COURSE NO.	CEP6112	P	Marks	Credit
		2	Sessional	1
			50	

COURSE OUTCOMES : At the end of this course, students will able to :	
CO1	Understand the characteristics of selected Civil Engineering Materials like metals, Timber, etc.
CO2	Learn standard principles and procedure of testing materials & prepare specimens for tests.
CO3	Learn practical applications of the test and writing technical reports.

LIST OF EXPERIMENTS:

1. To verify Parallelogram Law of forces
2. To verify LAMI'S theorem.
3. To determine the support reactions in case of a simply supported beam
4. To understand the behavior of a) mild steel b) Tor steel bar under tension by plotting stress strain curve.
5. To determine Brinell's hardness number .
6. To determine the impact value of the standard specimens izod impact testing machine.
7. To determine strain in a beam using strain Guage.

Note: A minimum of Five experiments to be performed.



For Examination to be held in the Year December 2022, 2023, 2024, 2025.

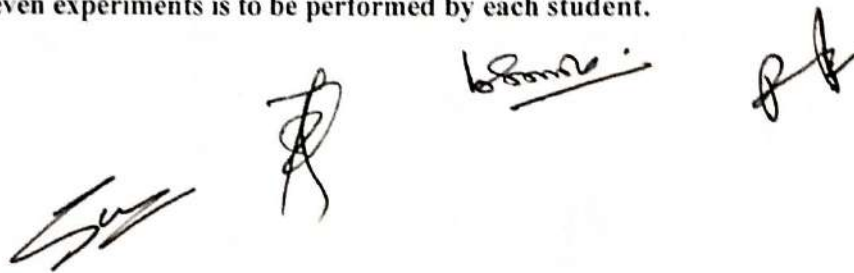
CLASS	1st SEMESTER				
BRANCH	CIVIL/ELECTRICAL ENGINEERING				
COURSE TITLE	PRINCIPLES OF ELECTRICAL ENGINEERING LAB				
COURSE TYPE	ENGINEERING SCIENCE COURSE				
COURSE NO.	EET2111	P	Marks		
		2	Sessional		Credit
			50		1

COURSE OUTCOMES : At the end of this course, students will able to :	
CO1	Experimentally verify the basic circuit theorems.
CO2	Measure current in series-parallel RLC circuits.
CO3	Measure load of 3 phase ac circuits connected in star and delta
CO4	Understand the basic characteristics of transformer .

LIST OF EXPERIMENTS:

1. Verification of Kirchoff's Laws.
2. Verification of Superposition Theorem.
3. Verification of Thevinin's Theorem.
4. Verification of Norton Theorem.
5. Verification of Reciprocity Theorem.
6. Verification of Maximum Power Transfer Theorem.
7. Measurement of current in various branches of RLC series-parallel circuit.
8. Study of three-phase A.C Circuits with Star and Delta connected Load.
9. Study of single phase transformer. Determination of polarity test of given single phase transformer.
10. To perform open and short circuit test on single phase transformer.

Note- Minimum of seven experiments is to be performed by each student.



For Examination to be held in the Year December 2022, 2023, 2024, 2025

CLASS	1st SEMESTER		
BRANCH	CIVIL/ MECHANICAL ENGINEERING		
COURSE TITLE	TECHNICAL COMMUNICATION SKILLS LAB		
COURSE TYPE	HUMANITIES & MANAGEMENT COURSE		
COURSE NO.	HMP1111	P	Marks
		2	Sessional
			50
			Credit
			1

COURSE OUTCOMES : At the end of this course, students will able to :	
CO1	Acquire proficiency in reading, writing, speaking & Listening skills.
CO2	Develop presentation, interview and interpersonal skills.

List of Practical's

Listening Skills

1. Listen to text read aloud in normal speed with focus on intonation,
2. After listening the student can fill in blanks, choose a suitable title, make a summery, and be able to answer comprehension questions from the passage read aloud.

Speaking skills

3. Conversation Skills
4. Presentation Skills

Personality Development

5. Types of Personality
6. Personality Disorder





Interpersonal Skills

7. Group Discussion
8. Interviews, Mock Interviews

Career Building & Resume writing

9. SWOT Analysis
10. Resume Writing

Note: 1. Eligibility to appear in Practical Test: 8 practicals
 2. Simulation/ virtual labs are used to enhance the practical ability of students.

UNIVERSITY OF JAMMU, JAMMU

COURSE SCHEME

B.E 2nd Semester Civil Engineering

For Examination to be held in the Year May 2023,2024,2025,2026.

Contact hours/week = 25

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL MARKS	CREDITS	% CHANGE
			L	T	P	INTERNAL	EXTERNAL			
BST1201	Basic Science Course	Engineering Mathematics-II	2	1	0	50	100	150	3	100%
BST1203	Basic Science Course	Advanced Engineering Physics	2	1	0	50	100	150	3	100%
CST3201	Engineering Science Course	Fundamentals of Programming using C	2	1	0	50	100	150	3	100%
MET5201	Engineering Science Course	Basic Mechanical Engineering	2	1	0	50	100	150	3	100%
MET5202	Engineering Science Course	Engineering Drawing	3	0	0	50	100	150	3	100%
HMT1201	Humanities & Management Course	Universal Human Values and Professional Ethics	2	1	0	50	100	150	3	100%
BSP1213	Basic Science Course	Advanced Engineering Physics Lab	0	0	2	50	-	50	1	100%
CSP3211	Engineering Science Course	Fundamentals of Programming using C Lab	0	0	2	50	-	50	1	100%
MEP5212	Engineering Science Course	Workshop Manufacturing Practices	0	0	3	50	0	50	1.5	100%
Total			13	5	7	450	600	1050	21.5	

For Examination to be held in the Year May 2023,2024,2025,2026.

CLASS	2nd SEMESTER					
BRANCH	COMMON TO ALL BRANCHES					
COURSE TITLE	ENGINEERING MATHEMATICS-II					
COURSE TYPE	BASIC SCIENCE COURSE					
COURSE NO.	BST1201	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

Course Outcomes: At the end of the course the students will be able to:	
CO1	Learn different tests to check the convergence or divergence of a series.
CO2	Find the Fourier series of a function.
CO3	Solve the differential equations of first order and higher order.
CO4	Learn the concept of linear and non- linear partial differential equations.

SECTION - A

UNIT-I: INTRODUCTION TO INFINITE SERIES

Convergence and divergence of a Series: p-test, Comparison Test, Cauchy Root Test, D'Alembert Ratio Test, Raabe's Test, Gauss test, Logarithmic Test, Leibnitz Test for alternating series (10 hrs)

UNIT-II: FOURIER SERIES

Euler's formula, sufficient conditions for a Fourier expansion, functions having points of discontinuity, change of intervals. Odd and even functions, Fourier expansion of Odd and even periodic functions, half range series, typical wave forms, Parseval's formula, complex form of Fourier -series. (10 hrs)

SECTION - B

UNIT-III: ORDINARY DIFFERENTIAL EQUATIONS

Differential equations of first order and first degree: Linear and Bernoulli's differential equations, Exact and non-exact differential equations. Higher order linear differential equations: Complementary solution, particular integral and general solution of these equations, variation of parameters technique to find particular integral of second order differential equations. (10 hrs)

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS

First order linear p.d.e, Non-Linear p.d.e. of 1st order, solution by Charpit's method, Four Standard forms of non-linear p.d.e with reference to Charpit's technique: $f(p,q) = 0$, $f(z, p,q) = 0$, $f(x,p) = g(y,q)$ and Clairaut's form. Homogenous and Non-homogenous higher order linear partial differential equations with constant coefficients, Rules for finding P.I and C.F, Non-Linear equations of 2nd order. (12 hrs)

RECOMMENDED BOOKS:

- | | | |
|---|----------------------------------|---|
| 1 | Advanced Engineering Mathematics | R.K. Jain, S.R.K Iyenger, 2 nd edition Narosa New Delhi. |
| 2 | Differential Equations | G. F. Simmons |
| 3 | Partial differential equations | M.D Rai Singhanian |
| 4 | Engineering Mathematics-I | Dr. Bhopinder Singh |
| 5 | Engineering Mathematics-II | Dr. Bhopinder Singh |

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.

For Examination to be held in the Year May 2023,2024,2025,2026

CLASS	2nd SEMESTER					
BRANCH	CIVIL/MECHANICAL ENGINEERING					
COURSE TITLE	ADVANCED ENGINEERING PHYSICS					
COURSE TYPE	BASIC SCIENCE COURSE					
COURSE NO.	BST1203	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

Course Outcomes: At the end of the course the students will be able to:	
CO1	Understand the significance of vector calculus and the importance of Maxwell's equations as the basis of Electromagnetic theory.
CO2	Assimilates the basic principles of Laser Physics, optical fibers, moment of inertia and their applications in various fields.
CO3	Familiarize with the simple harmonic oscillations, damped oscillations and quantities governing oscillations and understand the importance, generation of ultrasonic waves.
CO4	Acquire the concepts of semiconductors, types of semiconductors and various properties of semiconductor Physics and basic concepts of friction, types of friction and its applications.

SECTION-A

UNIT I: ELECTROMAGNETIC FIELDS AND WAVES

Concepts of Del Operator- gradient, divergence, curl and their physical significances, Displacement Current. Maxwell's equations in integral and differential form, Poynting vector and Poynting theorem, Electromagnetic wave propagation in free space (e m wave equations for electric & magnetic fields for free space) & their solutions (plane wave solution), velocity of E M waves, Relation between E_0 & B_0 . (08hrs)

UNIT-II: LASER AND FIBRE OPTICS

Concept and principal of Laser action, Spontaneous and Stimulated emission, Einstein's co-efficient, coherence and characteristics of laser light, Ruby, CO₂ laser, Applications of lasers, Optical Fiber, Physical structure and basic theory, critical angle, Acceptance angle & acceptance cone, Numerical Aperture, characteristics and general applications of optical fibers. (09hrs)

UNIT -III: PROPERTIES OF SURFACES, MOMENTS AND PRODUCTS OF INERTIA

Definition Moment of Inertia for areas-Parallel axis theorem-Perpendicular axis theorem-Moment of inertia for composite area-product of inertia form, mass moment of inertia (05 hrs)

SECTION-B

UNIT-IV: WAVES & OSCILLATIONS

Simple harmonic oscillations, damped oscillations and differential equation, logarithmic decrement, relaxation time and quality factor, ultrasonic waves and their production, applications of ultrasonic waves (05 hrs)

UNIT-V: SEMICONDUCTOR PHYSICS

Structure of Atoms, Energy band diagram, Metal, Insulator and Semiconductor, Intrinsic and Extrinsic semiconductors, Direct & Indirect semiconductors (E-k diagrams), Electron and hole concentration in intrinsic semiconductor, Charge densities in semiconductor, Generation & Recombination of charge carrier, Law of mobility & conductivity, Current densities in semiconductors, Fermi levels, Mass action law, Drift & Diffusion current and Einstein relation for p-n junction. Hall effect, Hall co-efficient & its applications (09 hrs)

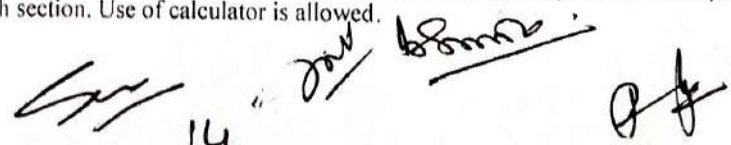
UNIT -VI: FRICTION

Laws of coulomb friction -Coefficient of Friction -Dry Friction -sliding Friction -ladder friction -Belt friction -Rolling Resistance. (06 hrs)

RECOMMENDED BOOKS:

1	Fundamentals of Electricity & Magnetism	Duggal & Chhabra
2	Fibre Optics	Ghatak, Tyagrajan
3	Lasers	K.R. Nambiyar,
4	Engineering Mechanics	A. K. Tayal
5	Sound	Gupta & Gupta
6	Semiconductor Physics and devices	Donald A. Neamen

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.



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For Examination to be held in the Year May 2023, 2024, 2025, 2026

CLASS	2nd SEMESTER					
BRANCH	CIVIL/ELECTRICAL ENGINEERING					
COURSE TITLE	FUNDAMENTALS OF PROGRAMMING USING C					
COURSE TYPE	ENGINEERING SCIENCE COURSE					
COURSE NO.	CST3201	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

COURSE OUTCOMES: At the end of the course students will be able to:	
CO1	Understand various software development tools like algorithm, pseudo code and flow charts for solving problems.
CO2	Understand the use of loops and decision making statements to solve the problems.
CO3	Apply different operations on arrays and user-defined functions to solve real-time problems.
CO4	Analyze the operation of pointers, structures and unions.
CO5	Implement file operations in C programming for a given application.

SECTION - A

UNIT 1. Introduction to Programming (Flow chart/pseudo code, compilation etc.)

Evolution of programming languages, the compilation process, source code, objects code, executable code, fundamentals of algorithms, flow charts. (4 Hours)

UNIT-2. Introduction to C, Data Types, Constants, Variables, Expressions, Statements, Operators, Data Input and Output.

Character set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Input-output Assignments. (6 Hours)

UNIT- 3. Control Statements, Storage Classes, Library Functions.

Control structures, Decision making and Branching, Decision making & looping. Storage Classes: Types of storage classes, Scoping rules. Standard Library Functions, advantages and use of various library functions (I/O functions, String, Character, Mathematics, Time and Date functions) (10 Hours)

SECTION - B

UNIT- 4. Functions, Arrays, User Defined Data Types, Structures

User defined and standard functions, Formal and Actual arguments, Functions category, function prototypes, parameter passing: Call-by-value, Call-by-reference, Nested functions. One dimensional Array, 2- dimensional arrays: declaration and their applications, searching in an array, Sorting in an array, String Manipulation, Passing array to a function. Declaration of structures. (10 Hours)

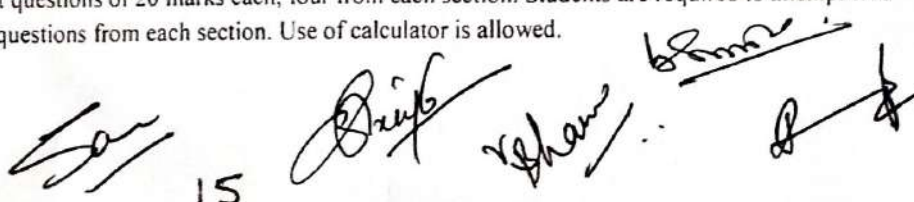
UNIT- 5. Pointers in C

Pointer variable and its importance, Pointer Arithmetic, pointers to functions, dynamic memory allocation. (10 Hours)

RECOMMENDED BOOKS:

1.	C How to Program	Paul J. Deitel
2.	Programming With C	Byron Gottfried
3.	Programming With C	E. Balaguruswamy.
4.	C The Complete Reference	Herbert Schildt
5.	Let us C	Yashwant Kanitkar

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.



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For Examination to be held in the Year May 2023, 2024, 2025, 2026

CLASS	2nd SEMESTER					
BRANCH	CIVIL/ELECTRICAL ENGINEERING					
COURSE TITLE	BASIC MECHANICAL ENGINEERING					
COURSE TYPE	ENGINEERING SCIENCE COURSE					
COURSE NO.	MET5201	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

COURSE OUTCOMES: At the end of the course students will be able to:	
CO1	Describe and use the basic concepts of Mechanical Engineering.
CO2	Principles and components of Mechanical Engineering.
CO3	Measuring and testing Methods of physical quantities.
CO4	Understanding properties of fluids and their uses.
CO5	Analyzing the performance of Hydraulic Machines.

SECTION - A

Mechanics and Materials: Basic principles, Equivalent force system, Equations of equilibrium, free body diagram, Equilibrium of rigid bodies. Friction: Dry friction, description and applications of friction.

Classification of engineering materials, Composition of Cast iron and Carbon steels, Alloy steels their applications. Mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, tensile test stress- strain diagram of ductile and brittle materials.

Measurement: Concept of measurements, errors in measurements, Temperature, pressure, velocity, flow strain, force and torque measurement, vernier calliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set.

Production Engineering: Elementary and theoretical aspects of production processes like casting, carpentry, welding etc.

(19 Hrs)

SECTION - B

Fluids: Fluid properties, density and viscosity etc. Types of fluids, Newton's law of viscosity, Pascal's law, Bernoulli's equation for incompressible fluids. Archimedes principles, buoyant force, working Principle of Hydraulic machines, pumps, turbines, Reciprocating pumps.

Thermodynamics: Introduction to Thermodynamics, Thermodynamics system (closed, open and isotropic systems), properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamics processes at constant pressure, volume, enthalpy and entropy, thermodynamic Equilibrium and types of equilibrium, Classification and working of boilers, efficiency and performance analysis, Steam properties and use of steam tables.

Internal Combustion (I.C.) Engines: Working principle of steam Engine, Carnot, Otto, Diesel and Dual cycles P-V and T-S diagrams and its efficiency, working of Two- stroke and Four- stroke Petrol and Diesel Engines. Friction: Dry friction: Description and applications of friction. Working Principle of Compressors.

(20 Hrs)

RECOMMENDEDBOOKS:

1.	Basic Mechanical Engineering	Agrawal CM
2.	Engineering Thermodynamics	Achuthan M
3.	Internal combustion engines	Ganesan
4.	Instrumentation and Measurements	Nakra & Chaudhary

NOTE: There will be eight questions of 20 marks each uniformly covering the entire syllabus. Students are required to attempt any five questions. Use of Calculator is allowed

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For Examination to be held in the Year May 2023, 2024, 2025, 2026

CLASS	2nd SEMESTER					
BRANCH	CIVIL/MECHANICAL ENGINEERING					
COURSE TITLE	ENGINEERING DRAWING					
COURSE TYPE	ENGINEERING SCIENCE COURSE					
COURSE NO.	MET5202	L	T	Marks		
DURATION OF EXAM	3 HOURS	3	0	Theory	Sessional	Credit
				100	50	3

COURSE OUTCOMES: At the end of the course students will be able to:	
CO1	Understand and use Engineering scales, Engineering Dimensioning and Lettering with accuracy.
CO2	Understand the various concepts related to Points, Lines and Planes.
CO3	Understand various problems related to Projections and sectioning of solids.
CO4	Fundamentally understand and perform Two and Three dimensional drawings.
CO5	Draw and understand orthographic projections of sections.

SECTION -A

Lettering, Dimensioning and Curves: Introduction, Lines, types of lines, Lettering, Single stroke Lettering, Dimensioning, placing of dimensions, Aligned and unidirectional. Curves used in Engineering Practice: Cycloidals, Involutes, Spirals and Hellices. Scale types, plain and diagonal. (05 hrs)

Projection of Points: Introduction to quadrant system, Concept of first angle third angle projection, Projection of points in first quadrant, second quadrant, third quadrant and fourth quadrant with conclusions. (05 hrs)

Projection of Straight Lines: introduction , projection of lines in various quadrants and with conditions like parallel, perpendicular and inclined cases. (05 hrs)

Projection of Planes: Projections of a plane w.r.t. the principle planes in simple and inclined positions. Rotation method and the Auxiliary plane method. (05 hrs)

SECTION -B

Projection of Solids: Classification and main features-Prisms and Pyramids. Projection of solids inclined to both the reference planes by (I) Rotation Method, and (II) Auxiliary plane method. Projection of solids in combination (Co-axial) in simple and inclined positions. (06 hrs)

Sectioning of Solids: Object of sectioning, Types of cutting planes, True shape of section, Auxiliary views of sections of multiple co-axial solids in simple and titled conditions. (05 hrs)

Development of Surfaces: Classification of surfaces, Methods of development -Straight line method and Radial line method, Development of solids and hollow sections in full or part development of transition pieces. (05 hrs)

Orthographic Projections: Orthographic projection of simple blocks (First & Third angles), to draw the third view from given two views. Missing lines in projection. (05 hrs)

RECOMMENDED BOOKS:

- | | |
|---------------------------------------|-----------------------------|
| 1. Engineering Drawing | P.S Gill |
| 2. Practical Geometry | V. Laxminarayan & GEV |
| 3. Engineering Graphics | K.L. Narayanan & P. Kamaish |
| 4. Principles of Engineering Graphics | P.E Giesecks |
| 5. Engineering Graphics | Frederic & Michelle. |

NOTE: There will be total eight questions of 20 marks each, four from each section. Students are required to attempt five questions selecting at least two questions from each section. Use of calculator is allowed.

For Examination to be held in the Year May 2023, 2024, 2025, 2026

CLASS	2nd SEMESTER					
BRANCH	CIVIL/MECHANICAL ENGINEERING					
COURSE TITLE	UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS					
COURSE TYPE	HUMANITIES & MANAGEMENT COURSES					
COURSE NO.	HMT1201	L	T	Marks		
DURATION OF EXAM	3 HOURS	2	1	Theory	Sessional	Credit
				100	50	3

COURSE OUTCOMES: At the end of the course students will be able to:	
CO1	Understand the meaning of happiness and prosperity for a human being.
CO2	Comprehend the holistic approach about the family and society.
CO3	Understand the harmony in the nature and self-regulation in nature
CO4	Apply the understanding of harmony in existence in their profession.

SECTION A

UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration-what is it?-its content and process; 'Natural Acceptance' and Experiential Validation-as the mechanism for self exploration
3. Continuous Happiness and Prosperity-A look at basic Human Aspirations (06 hrs)

UNIT 2: Understanding Harmony in the Human Being-Harmony in Myself

1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
2. Understanding the needs of Self ('I') and 'Body'- Happiness and physical facility.
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) (06 hrs)

UNIT 3: Understanding Harmony in the Family and Society-Harmony in Human-Human Relationship

1. Understanding Harmony in the family-the basic unit of human interaction
2. Understanding values in human-human relationship; meaning of justice (*Nyaya*) and program for its fulfilment to ensure mutual happiness (*Ubhay-tripti*); Trust (*Vishwas*) and Respect (*Samman*) as the foundation all values of relationship
3. Understanding the meaning of trust (*Vishwas*); Difference between intention and competence. (08 hrs)

SECTION B

UNIT 4: Understanding Harmony in the Nature and Existence-Whole existence as Co-existence

1. Understanding the harmony in the Nature
2. Inter connectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature.
3. Understanding existence as co-existence of mutually interacting units in all pervasive space (08 hrs)

UNIT 5: Implication of the above holistic understanding of harmony on professional ethics

1. Natural acceptance of human values.
2. Definitiveness of Human value conduct.
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal order. (06 hrs)

UNIT 6: Competence in professional ethics:

1. Ability to utilize the professional competence for augmenting universal human order.
2. Ability to identify the scope and characteristics of people friendly and eco- friendly production systems.
3. Ability to identify and develop appropriate technologies and management patterns for above production systems. (06 hrs)

RECOMMENDED BOOKS:

- 1 A foundation course in human values and professional Ethics RR Gaur, R sangal, G.P Bagaria

REFERENCE BOOKS:

- 1 Indian knowledge system B. maha devan, vinayak rajat bhat, nagendra pavana r.n
- 2 Indian etho sand modern management Blbajpai
- 3 Science and humanism, PL Dhar ,rrgaur

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section.

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For Examination to be held in the Year May 2023,2024,2025,2026

CLASS	2nd SEMESTER				
BRANCH	CIVIL/MECHANICAL ENGINEERING				
COURSE TITLE	APPLIED ENGINEERING PHYSICS LAB				
COURSE TYPE	ENGINEERING SCIENCE COURSE				
COURSE NO.	BSP1213	P	Marks	Sessional	Credit
		2	50		1

COURSE OUTCOMES: At the end of the course students will be able to:	
CO1	Gain knowledge about the scientific methods of measuring different physical parameters based on the concepts of Physics.
CO2	Develop the experimentation skills by displaying minimized measurement errors.
CO3	Demonstrate and improve the practical skills to use the appropriate physical concepts to obtain the solutions pertaining to different physics experiments.
CO4	Acquire essence of scientific temper infused with innovation and creativity.

LIST OF EXPERIMENTS:

1. To find the frequency of AC mains using a sonometer.
2. To determine the wavelength of Sodium light using a plane transmission diffraction grating.
3. To find co-efficient of self- induction of a coil by Anderson's Bridge using headphone.
4. To find the wavelength of monochromatic light using Newton's rings apparatus.
5. To evaluate the value of Planck's constant using a photocell.
6. To determine the plateau and optimal operating voltage of Geiger Muller (GM) Counter
7. To study the variation of Magnetic field by using Stewart and Gee's Tangent galvanometer.
8. To find the dispersive power of a given prism using a spectrometer.
9. To find the impedance of LCR circuit.
10. To study the Common base/ common emitter characteristics of PNP/NPN junction transistor.
11. To determine the specific rotation of sugar / glucose using Laurent's half shade Polarimeter.

NOTE: A minimum of Eight experiments is to be performed covering the diverse aspects of engineering physics



For Examination to be held in the Year May 2023,2024,2025,2026

CLASS	2nd SEMESTER					
BRANCH	CIVIL/ELECTRICAL ENGINEERING					
COURSE TITLE	FUNDAMENTAL PROGRAMMING USING C LAB					
COURSE TYPE	ENGINEERING SCIENCE COURSE					
COURSE NO.	CSP3211	P		Marks		
		2	Theory	Sessional	Credit	
			-	50	1	

COURSE OUTCOMES: At the end of the course students will be able to:	
CO1	Understand the working of different compilers and editors for writing programs in C
CO2	Exercise basic syntax, operators and control statements to write C programs
CO3	Execute programs based on user defined functions and recursive functions
CO4	Implement arrays, pointers to access variables and functions.

List of Experiments

- Experiment 1: Problem solving using computers: Familiarization with programming Environment.
- Experiment 2: Variable types and type conversions: Simple computational problems using arithmetic expressions.
- Experiment 3: Branching and logical expressions: Problems involving if-then-else Structures.
- Experiment 4: Loops, while and for loops: Iterative problems e.g., sum of series
- Experiment 5: 1D Arrays: searching, sorting: 1D Array manipulation
- Experiment 6: 2D arrays and Strings, memory structure: Matrix problems, String Operations
- Experiment 7: Functions, call by value: Simple functions
- Experiment 8: Structures and structure operations
- Experiment 9: Implementation of Pointers
- Experiment 10: Dynamic memory allocation.

NOTE: A minimum of Eight experiments is to be performed

For Examination to be held in the Year May 2023,2024,2025,2026

CLASS	2nd SEMESTER					
BRANCH	CIVIL/ECE/COMPUTER/CSE/IT ENGINEERING					
COURSE TITLE	WORKSHOP MANUFACTURING PRACTICES					
COURSE TYPE	ENGINEERING SCIENCE COURSE					
COURSE NO.	MEP5212	P		Marks		
		3	Theory	Sessional	Credit	
			-	50	1.5	

COURSE OUTCOMES: At the end of the course students will be able to:	
CO1	Introduction to different manufacturing methods in different fields of engineering.
CO2	Understanding different manufacturing techniques and their relative advantages/disadvantages with respect to different applications.
CO3	Acquire a minimum practical skill with respect to the different materials.
CO4	Creation of simple components using different materials.

SHOP PRACTICE:

Unit -I: - Carpentry

1. Middle/Cross lap joint
2. Mortise and Tenon Joint T -Joint
3. Pattern making of open bearing

Unit II: -Foundry

1. Moulding of open bearing (simple pattern)
2. Moulding of Sliding Job of Bench Vice (Split piece pattern)

Unit -III: - Smithy

1. Upsetting, drawing and bending operation

Unit -IV: - Welding

1. Preparation of single V- Butt joint by arc/gas welding.
2. Preparation of Double V-Butt joint by gas /arc welding.
3. Corner Joint by arc/gas welding
4. Lap Joint by arc/gas welding

Unit - V: - Fitting

1. Assembly of snap fitting of MS-Flat pieces (Male and Female)
2. Assembly and fitting of two L-shaped rectangular MS-flat pieces.

RECOMMENDED BOOKS:

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|--|-------------------------------------|
| 1. Workshop Technology | Hajra and Chowdhary |
| 2. Manufacturing Technology Vol I and II | Rao. P.N |
| 3. Manufacturing Technology | Gowri.P.Hariharan and A.Suresh Babu |

NOTE: A minimum of eight experiments is to be performed

