SCHEME OF INSTRUCTION & EXAMINATION

B.E. (Civil Engineering) II – SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction			Scheme of Examination		Credits
			L	T	Pr/ Drg	CIE	SEE	
Theory Courses								
1	HS 101 EG	English	2	-	-	30	70	2
2	BS 203MT	Mathematics -II	3	1	-	30	70	4
3	BS 202 PH	Engineering Physics	3	1	-	30	70	4
4	ES 302 CE	Engineering Mechanics	3	1	-	30	70	4
Practical/ Laboratory Courses								
5	HS 151 EG	English Laboratory	-	-	2	25	50	1
6	BS 251 PH	Physics Laboratory	-	-	3	25	50	1.5
7	ES 353 CE	Engineering Graphics	-	-	2 x 3hrs	50	50	3
			11	**2**	**10**			**19.5**

* These courses, namely, Engineering Mechanics and Engineering Graphics and Design are also offered as service courses by the Department of Civil Engineering to the other departments.

ENGLISH

HS101 EG

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 2

Objectives:

To enhance the English language abilities of Engineering students, especially in reading and writing, by

1. Using authentic material for language learning
2. Exposing them to a variety of content-rich texts
3. Strengthening their grammar and vocabulary
4. Improving their reading and comprehension skills
5. Honing their writing skills
6. Encouraging them to think creatively and critically

Outcomes:

On successful completion of the course, the student will be able to

1. Read, understand, and interpret a variety of written texts
2. Use appropriate vocabulary and correct grammar
3. Undertake guided and extended writing with confidence.

UNIT – I

Reading : RK Narayan, "A Horse and Two Goats"
Vocabulary : Word formation—Prefixes, Suffixes, Root Words
Grammar : Articles, Prepositions, Determiners
Writing : Guided Writing (Expanding the outline/Writing from verbal cues)

UNIT – II

Reading : Rudyard Kipling, "If"
Vocabulary : Word formation—Compounding and Blending, Contractions
Grammar : Transitions, Connectives
Writing : Paragraph Writing

UNIT – III

Reading : Martin Luther King Jr., "I Have a dream"
Vocabulary : Synonyms, Antonyms, One Word Substitutes
Grammar : Voice
Writing : Letter Writing

UNIT – IV

Reading : Robert Frost, "Road Not Taken"
Vocabulary : Homophones, Homonyms, Homographs
Grammar : Narration (Direct-Indirect Speech)
Writing : Report Writing

UNIT – V

Reading : George Orwell, “The Sporting Spirit” (Excerpt)
Vocabulary : Inclusive Language, Euphemisms
Grammar : Tense
Writing : SOP

Suggested Reading:

1. Board of Editors. Language and Life: A Skills Approach. Orient BlackSwan, 2018.
2. Sudharshana, NP and C Savitha. English for Engineers. Cambridge University Press, 2018.
3. Kumar, Sanjay and Pushp Lata. English Language and Communication Skills for Engineers. Oxford University Press, 2018.

MATHEMATICS-II

BS 203 MT

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 4

Objectives:

1. To study matrix algebra and its use in solving system of linear equations and in solving eigen value problems
2. To provide an overview of ordinary differential equations
3. To study special functions like Legendre and Beta Gamma functions
4. To learn Laplace Transforms and its properties

Outcomes:

1. Solve system of linear equations and eigen value problems
2. Solve certain first order and higher order differential equations
3. Solve basic problems of Beta Gamma and Legender's Function.
4. Apply Laplace Transforms; solve ordinary Differential Equations by using it.

UNIT – I

Matrices: Rank of a matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigenvectors, Properties of eigen values, Cayley - Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

UNIT – II

Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.

UNIT – III

Differential Equations of Higher Orders: Solutions of second and higher order linear homogeneous equations with constants coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters, solution of Euler-Cauchy equation.

UNIT – IV

Special Function: Gamma Functions, Beta Functions, Relation Between Beta and Gamma Function, Error Functions. Power Series Method, Lengender's Differential Equations and Legender's Polynomial $P_n(x)$, Rodrigue's Formula (without proof).

UNIT – V

Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary Differential Equations using Laplace Transforms.

Suggested Reading:

1. R.K. Jain & S.R.K. lyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition,2014.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, 2012.
3. Dr.B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition,2014.
4. B.V. Ramana, *Higher Engineering Mathematics*, 23rd reprint, 2015.
5. N. Bali, M. Goyal, A text book of Engineering *Mathematics*, Laxmi publications,2010
6. H.K. Dass, Er. Rajnish Varma, *Higher Engineering Mathematics*, Schand Technical Third Edition.

ENGINEERING PHYSICS

BS 202 PH

Instruction: 3 periods per week+ 1period for tutorial *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 4

Objectives:

1. Aware of limits of classical free electron free theory and to apply band theory of solids
2. Acquire knowledge on various properties of semiconductors.
3. Grasp the intricacies in semiconductor-optical interaction

Outcomes:

1. Distinguish materials based on band theory of solids
2. Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
3. Appreciate use of optical absorption by semiconductors.

UNIT – I

Crystallography: Introduction, Types of crystal systems, Bravais lattices, Lattiee planes and Miller Indices (Cubic system), Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method.

Crystal Defects: Classification of point defects, Concentration of Schottky defects in metals and ionic crystals, Concentration of Frankel defects, Line defects, Screw and Edge dislocations, Burger's vector

UNIT – II

Band Theory of Solids & Semiconductors: Classical free electron theory (qualitative), Kronig Penney model (qualitative treatment), Energy band formation in solids, Intrinsic and Extrinsic semiconductors, Concept of a hole, Carrier concentration and conductivity in intrinsic semiconductors, Formation of P-N junction diode and its I – V characteristics, Thermistor and its characteristics, Hall effect and its applications.

Dielectric Materials: Dielectrics, Types of polarizations, Electronic, Ionic, Orientational and Space charge polarizations, Expression for Electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by capacitance Bridge method, Ferro electricity, Barium titanate, Applications of Ferroelectrics.

UNIT – III

Wave Mechanics: Matter waves –de-Broglie wavelength, properties of wave function, Physical significance, Schrodinger time dependent and time in-dependent wave equation. Particle in a 1-D box.

Electromagnetic theory: Basic laws of electricity and magnetism, Maxwell's equations in integral and differential forms, Conduction and displacement current, Relation between D, E and P – ***Electromagnetic waves:*** Equation of plane wave in free space, Poynting theorem.

UNIT – IV

Magnetic Materials: Classification of magnetic materials: dia, para, ferro, antiferro and ferrimagnetic materials, Weiss molecular field theory of ferromagnetism, Magnetic domains, Hysteresis curve, soft and hard magnetic materials, Ferrites: Applications of ferrites.

Superconductivity: Introduction, General properties of super conductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), Introduction to High T_c superconductors, Applications of superconductors.

UNIT – V

Lasers: Characteristics of Lasers, spontaneous and stimulated emission of radiation, Einstein's Coefficients, population inversion, Ruby Laser, Helium Neon Laser, Semi-Conductor Laser and applications of lasers.

Fiber Optics: Introduction, Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Fiber drawing process (double Crucible Method), Losses in optical fibers, applications of optical fibers.

Suggested Reading:

1. B.K. Pandey and S. Chaturvedi Engineering Physics Cengage Learning 2012
2. A.K. Bhandhopadhya, Nano Materials, New Age International, 1st Edition, 2007
3. M.S. Avadhanulu and P.G. Kshirusagar, Engg. Physics, S. Chand & Co. 1st Edition, 1992.
4. C.M. Srivastava and C. Srinivasan – Science of Engg Materials, New Age International.
5. R.K Gaur and S.L Gupta- Engineering Physics, Dhanpathrai Publications, New edition.
6. Sanjay D Jain & Girish G Sahasrabudhe -Engineering Physics, University Press

ENGINEERING MECHANICS

ES 302 CE

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 4

Objectives:

The objectives of this course is to impart knowledge of

1. Resultant and equilibrium of force system ,concept of friction,analyze the Perfectframes.
2. Obtaining centroids and moments of inertia for various sections.
3. Basic concepts of dynamics, Kinematics and Kinetics and their applications to problem solving

Outcomes:

After completing this course, the student will be able to:

1. Apply the fundamental concepts of forces, Resultant and Equilibrium conditions for static loads
2. Analyse forces in members of a Perfect frame using method of joints and method of sections, analyze friction for single and connected bodies
3. Determine the centroid and moment of inertia for various sections
4. Apply the basic concepts of dynamics for rectilinear and curvilinear motion and kinetics Using D' Alembert's Principle
5. Solve problems involving work energy principles and impulse momentum theory.

UNIT – I

*Introduction to Engineering Mechanics***:** Basic Concepts
*System of Forces***:** Coplanar Concurrent Forces, Components in Space – Resultant of coplanar and spatial systems, Moment of Force and Couple and its Application to coplanar system
*Equilibrium of Systems of Forces***:** Free Body Diagrams, Equations of Equilibrium and applications to Coplanar System.

UNIT – II

*Friction***:** Theory of friction, Laws of friction, Friction connected to single and connected bodies, Wedge friction.
*Analysis of Perfect Frames***:** Types of Frames, Assumptions for forces in members of perfect frame, Method of joints and Method of sections for Cantilever Trusses, Simply supported Trusses.

UNIT – III

*Centroid***:** Centroid of simple areas (from basic principles), Centroid of Composite areas.
Centre of Gravity: Centre of gravity of simple bodies (from basic principles).
Area Moment of Inertia: Definition, Moment of inertia of simple areas (from basic principles), Polar Moment of Inertia, Transfer formula, Moment of Inertia of Composite areas.
*Mass moment of Inertia***:** Mass moment of inertia of simple bodies (from basic principles).

UNIT – IV

*Kinematics***:** Introduction, Motion of particle, Rectilinear and Curvilinear motions, Velocity and Acceleration, Types of Rigid body, Angular motion, Fixed axis rotation.
*Kinetics:*Introduction, fundamental equation of kinetics for a particle, D' Alembert's principle

for particle motion, connected system and Fixed Axis Rotation

UNIT – V

*Work - Energy Method***:** Introduction, Equations for Translation, Work-Energy Applications to Particle Motion, Connected System and Fixed Axis Rotation.

*Impulse Momentum Method***:** Linear impulse momentum, law of conservation of momentum, coefficient of restitution, Elastic impact.

Suggested Reading:

1. Ferdinand L. Singer, *Engineering Mechanics Statics and Dynamics*, Harper Collins publishers inc, New York, 1994.
2. Ferdinand L. Singer, K. Vijaya Kumar Reddy, J. Suresh Kumar, *Singer's Engineering Mechanics*, BS Publications, Hyderabad, 2011.
3. S.S Bhavakatti, K. G. Rajashekarappa *Engineering Mechanics*, New age International publishers, Delhi,1994.
4. Rajeshakharan, S. and Sankara Subrahmanyam, G., *Engineering Mechanics Statics and Dynamics,* Vikas Publications, Delhi, 2005.
5. Junarkar, S.B. and H.J. Shah., *Applied Mechanics*, Charotar Publishing House Pvt. Ltd, Anand, 2015.

ENGLISH LABORATORY

HS 151 EG

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Objectives:

1. Learn IPA
2. Learn minimal pairs and types of syllables
3. Overcome the difficulties with sounds of English
4. Learn to participate well in gds, Debates and Presentations
5. Communicate with appropriate body language and expressions

Outcomes:

1. Learn IPA
2. Learn minimal pairs and types of syllables
3. Overcome the difficulties with sounds of English
4. Learn to participate well in gds, Debates and Presentations
5. Communicate with appropriate body language, expressions

1. Introduction to English Phonetics: Organs of Speech: respiratory, articulatory and phonatory systems; ***Sounds of English:*** Introduction to International Phonetic Alphabet; Minimal pairs; Syllable; Word Stress; Introduction of rhythm and intonation; Difficulties of Indians speakers with stress and intonation.

2. Speaking Activities: Self Introduction, Picture perception, JAM.

3. Group discussion, Debate, Presentation skills

4. Listening Activities: Listening to different types of materials for effective comprehension

5. Role play: Use of dialogues in a variety of situations and settings

Suggested Reading:

1 E. Suresh Kumar, a Handbook for English Language Laboratories (with CD).
2 Revised edition, Cambridge University Press India Pvt. Ltd. 2014
3 T. Balasubramanian. A Textbook of English Phonetics for Indian Students. Macmillan, 2008.
4 J. Sethi et al., A Practical Course in English Pronunciation (with CD). Prentice Hall of India, 2005.
5 Hari Mohan Prasad. How to Prepare for Group Discussions and Interviews. Tata McGraw Hill, 2006.

PHYSICS LABORATORY

BS 251 PH

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1.5

Objectives:

1. Make precise measurements using basic physical principles and acquire skills to handle the instruments
2. Relates the theoretical Knowledge to the behaviour of Practical Physical world.
3. Analyse errors in the experimental data.
4. Plot graphs between various physical parameters.

Outcomes:

1. Conduct experiments, take measurements independently.
2. Write appropriate laboratory reports.
3. Compute and compare the experimental results and draw relevant conclusions.
4. Use the graphical representation of data and estimate results from graphs

LIST OF EXPERIMENTS

1. To determine the Dielectric constant and Phase transition temperature of Lead Zirconium Titanate (PZT).

2. To draw the I - V Characteristics of P-N Junction diode and to evaluate the resistance.

3. To find the values of Electrical conductivity and energy gap of Ge crystal.

4. Determination of rigidity of modulus of Torsion pendulum.

5. Determination of carrier concentration, Mobility and Hall Coefficient of Ge crystal using Hall Effect Experiment.

6. To determine the constants of A, B and **α** using Thermistor characteristics.

7. To draw the curve between the magnetizing field and the intensity of magnetization of the specimen (soft iron rod) and to find out

i)Coercivity ii) Retentivity and iii) Hysteresis loss.

8. To draw the I - V Characteristics of a solar cell and to calculate the

i) Fill factor Efficiency and ii) Series resistance.

9. To Determine the Numerical aperture (NA) of Optical fiber.

10. To determine the wave length of the given Laser source

Note: Minimum eight experiments should be conducted in the semester

Suggested Reading:

1. N.K. De, "Basic Electrical Engineering", Universities Press, 2015.
2. J.B. Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria & Sons Publications, 2002.
3. J.B. Gupta, "Utilization of Electric Power and Electric Traction" S.K. Kataria & Sons Publications, 2010

ENGINEERING GRAPHICS

ES 353 CE

Instruction: 2L +4D periods per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 50 marks*
Credits: 3

Objectives:

1. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. Communicate effectively using graphical methods
3. Understand the techniques, skills, and modern engineering tools necessary for engineering practice.

Outcomes:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards and solid modelling
4. Exposure to computer-aided geometric design
5. Exposure to creating working drawings

Sheet No	Description of the Topic	Contact Hours	
		Lecture	Drawing
1	Principles of Engineering Graphics and their significance, usage of drawing instruments.	1	
2	**Conic Sections – I** Construction of ellipse, parabola and hyperbola given focus and eccentricity.	1	2
3	**Conic Sections – II** Construction of ellipse (given major and minor axis), parabola (given base and height), rectangular hyperbola.		2
4	**Cycloids** (cycloid & epicycloids)	1	2
5	**Involutes** (involute of triangle, square & circle)		2
6	**Scales** (plain & diagonal scales)	1	4
7	**Introduction to AutoCAD** Basic commands and simple drawings.		4
8	**Orthographic Projection** Projections of points situated in different quadrants.	1	2
9	**Projections of straight lines – I** Line parallel to both the reference planes, line perpendicular or inclined to one reference plane.	1	2
10	**Projections of straight lines – II** Line inclined to both the reference planes.	1	2
11	**Projections of planes – I** Perpendicular planes	1	2
12	**Projections of planes – II** Oblique planes		2
13	**Projections of solids – I** Polyhedra and solids of revolution, Projections of solids in	1	2

	simple position.		
14	**Projection of solids – II** Projections of solids when the axes inclined to one or both the reference planes.	1	4
15	**Section of solids – I** When the sectional plane is parallel or perpendicular to one reference plane.	1	2
16	**Section of solids – II** When the sectional plane is inclined to one reference plane.		2
17	**Development of surfaces – I** Prisms and Cylinders	1	2
18	**Development of surfaces – II** Pyramids and Cones		2
19	**Intersection of surfaces – I** Intersection of cylinder and cylinder	1	2
20	**Intersection of surfaces – II** Intersection of cylinder and cone		2
21	**Isometric projection – I** Planes and simple solids	1	2
22	**Isometric projection – II** Combination of two or three solids		2
23	Conversion of Isometric Views to Orthographic Views	1	2

Note:

1. At least 20 sheets must be covered.
2. Sheet number 1 to 6 (Graph sheets / drawing sheets)
3. Sheet number 7 to 23 (AutoCAD drawings).

Suggested Readings

1 Bhatt N.D., Panchal V.M. & Ingle P.R., *Engineering Drawing*, Charotar Publishing House, 2014
2 Shah, M.B. & Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education, 2008
3 S.N Lal, Engineering Drawing with Introduction to Auto CAD, Cengage Learning India Pvt Lid, New Delhi, 2018
4 Agrawal B. & Agrawal C. M., Engineering Graphics, TMH Publication, 2012
5 Narayana, K.L. & P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, 2008
6 Corresponding set of CAD Software Theory and User Manuals