KAKATIYA UNIVERSITY
BACHELOR OF TECHNOLOGY First Year
Structure of Curriculum-Common to All Branches

Semester-I (First Year)

Branch/Course Common to all branches of UG Engineering & Technology

Sl. No.	Category/ Code	Course Title	Internal Marks	External Marks	Total marks	Lecture	Tutorial	Practical	No of Credits
1	Basic Sciences Course /BSC 101	Physics	30	70	175	3	1	-	5.5
		Lab.	25	30		-	-	3	
2	Basic Sciences Course /BSC 103	Mathematics-I	30	70	100	3	1	0	4
3	Engineering Science Courses/ESC101	Basic Electrical Engineering	30	70	175	3	1	-	5
		Lab.	25	50				2	
4	Engineering Science Courses/ESC102	Engineering Graphics & Design	30	70	175	1	0	4	3
		Lab.	25	50					
5	Engineering Science Courses	Engineering Mechanics	30	70	100	3	1	0	4
		Total Credits							21.5

In order to balance the load of the some of the subjects which are made in groups (Physics/Chemistry, Engineering Graphics & Design/ Workshop and Manufacturing Practices, Programming for Problem Solving/Engineering Mechanics), the half of the branches of B.Tech course offer one subject of group in odd semester and other half of the branches of B.Tech course offer another subject of same group in odd semester. In the even semester the subjects of the group will be exchanged

MANDATORY INDUCTION PROGRAM

BEFORE BEGINNING OF FIRST SEMESTER

3 Weeks Duration

- Physical Activity
- Creative Arts
- Universal Human Values
- Literay
- Proficiency Modules
- Lectures by Eminent People
- Visits to Local Areas
- Familiarization to Dept./Branch & Innovations

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

PHYSICS
(Theory)

Course code	BSC101				
Category	Basic Science Course				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Internal marks = 30
	3	**1**	**-**	**4**	External Marks = 70

Detailed contents:

UNIT-I

SCALARS AND VECTORS

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates.***(8 lectures)***

UNIT II

POTENTIAL ENERGY FUNCTION

Potential energy function; F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler's problem; Application: Satellite manocurves.***(7 lectures)***

SIMPLE HARMONIC MOTION

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.***(6 lectures)***

UNIT- III

RIGID BODY

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.***(5 lectures)***

UNIT-IV

ELECTROSTATICS IN VACUUM

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Faraday's cage and coffee-ringeffect.Boundary conditions of electric field and electrostatic potential,method of images,energy of a charge distribution and its expression in terms of electric field ***(8 lectures)***

MAGNETOSTATICS

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities***.(6 lectures)***

UNIT-V

FARADAY'S LAWS

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law.***(3 lectures)***

DISPLACEMENT CURRENT, MAGNETIC FIELD DUE TO TIME DEPENDENT ELECTRIC FIELD AND MAXWELL'S EQUATIONS

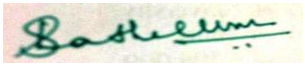
Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time-dependent electric field; calculating magnetic field due to changing electric fields in quasi-static approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. ***(5 lectures)***

Suggested Text Books

(i) Introduction to Mechanics — MK Verma
(ii) Introduction to Electrodynamics---David Griffiths
(iii) Engineering Mechanics, 2nd ed. — MK Harbola

Suggested Reference Books:

(i) Halliday and Resnick, Physics
(ii) W. Saslow, Electricity, magnetism and light
(iii) An Introduction to Mechanics — D Kleppner& R Kolenkow
(iv) Principles of Mechanics — JL Synge & BA Griffiths
(v) Mechanics — JP Den Hartog
(vi) Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
(vii) Mechanical Vibrations — JP Den Hartog
(viii) Theory of Vibrations with Applications — WT Thomson



Dr. C.J. Sreelatha
Chairperson Board of Studies in Physics,KU,Wgl
Date:

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

PHYSICS
(Lab.)

Course code	BSC101				
Category	Basic Science Course				
Course title	**Physics-Practical**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Internal marks = 25
	-	**-**	**3**	**1.5**	External Marks = 50

APPLIED PHYSICS LAB

Choice of experiments from the following:

1. Coupled oscillators.

2. Experiment on moment of inertia measurement.

3. Experiments with gyroscope.

4. Resonance phenomena in mechanical oscillators.

5. LC circuit and CR circuit.

6. Resonance phenomena in LCR circuits.

7. Magnetic'field from Helmholtz coil.

8. Measurement of Lorentz force in a vacuum tube.

KAKATIYA UNIVERSITY
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SEMESTER – I
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MATHEMATICS -1

MAXIMUM HOURS:48

Unit 1: Sequences and Series

Sequences , series, general properties of series , series of positive terms, comparison test, integral test, ratio test, Cauchy's root test, D' Alembert's ratio test. Fourier series, Euler's formula, condition for Fourier expansion, Even and odd functions.

(Sections 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 10.1, 10.2, 10.3, 10.6 of Text Book)

Unit 2: Calculus

Fundamental theorems (without proofs) Rolle's Theorem (algebraic and geometrical interpretation, geometrical proof), Legrange's mean value theorem, Cauchy's mean value theorem, Taylors theorem, Maclaurin's series. Asymptote's parallel to axis, curve tracing (simple curves only), radius of curvature for cartesian curves.

(Sections 4.3, 4.10, 4.11, 4.16, 4.17, 9.7 of Text Book)

Unit 3: Multivariable Differential Calculus

Functions of two or more variables, partial derivatives, total derivatives, change of variables, Jacobians, Taylor's theorem (without proof), errors and approximations, maxima and minimum of functions of two variable. Scalar and vector point functions, gradient, divergence, curl, physical interpretation.

(Sections 5.1, 5.2, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 8.5, 8.6 of Text Book)

Unit 4: Multivariable Integral Calculus

Double integrals, change of order of integration , triple integrals, change of variables, beta and gamma function, line integrals, surface integrals, volume integrals, Greens, Gauss and Stokes theorems (without proof) irrotational fields, solenoidal fields.

(7.1, 7.2, 7.5, 7.7, 7.14, 7.15, 7.16, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16, 8.18 of Text Book)

Unit 5: Differential Equations

Differential equations of first order, formation of differential equations. variable separable form, Bernouli's equation, exact equations, physical applications (Newton's law of cooling, rate of decay) linear differential equations, applications of linear differential equations (simple harmonic motion, oscillating electric circuits). (Sections 11.1, 11.3, 11.4, 11.6, 11.10, 11.11, 12.6, 12,8, 14.1, 14.2, 14.5 of Text Book)

Text Book: B.S. Grewal et.al, Higher Engineering Mathematics, 43rd Edition, Khanna Publicationns.

Reference: Erwin Kreyszig, Aadvanced Engineering Mathematics, 8th Edition, John Wiley & Sons.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

BASIC ELECTRICAL ENGINEERING

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks:30
3	1	0	4	External Marks:70

UNIT – I (7+3)

DC circuits: Introduction, network elements (R, L and C), electric power, electrical energy, Ohm's law, Kirchhoff's laws, resistances in series-voltage divider rule; resistances in parallel-current divider rule, series & parallel circuits, mesh analysis and nodal analysis.

DC network theorems: Introduction, superposition theorem, Thevenin's theorem, Norton's theorem and maximum power transfer theorem. Time-domain analysis of first-order RL and RC circuits.

UNIT – II (7+3)

1-ϕ AC circuits: Phasor representation of sinusoidal quantities, average and R.M.S values of sinusoidal wave form, Form Factor, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), series resonance.

3-ϕ AC circuits: Production of 3-ϕ voltages, voltage & current relationships of line and phase values for balanced star and delta connections.

UNIT – III (7+3)

Transformers : Magnetic materials, BH characteristics, Construction, principle of operation & applications of 1-ϕ transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer and 3-ϕ transformer connections.

Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Significance of torque-slip characteristic, starting and speed control of induction motor and Applications.

Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications.

UNIT – IV (7+3)

DC Generators : Constructional features, operating principle, EMF equation, types of DC Generators, magnetization characteristics of DC shunt generator and Applications.

DC Motors: Principle of Operation, Torque Equations, Operating Characteristics of DC Motor, Speed Control Methods and Applications.

Synchronous Generators : Construction and principle of operation of Synchronous generators.

UNIT –V (6+2)

Power Converters : DC-DC buck and boost converters, duty ratio control. Single-phase voltage source inverters and sinusoidal modulation.

Electrical Installaiton: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. B.L.Thereja, A.K.Thereja, "Electrical Technology Vol. I & II"**,** *S.Chand & Company Ltd*, edn , 2005.
2. Edward Hughes, "Electrical & Electronics Technology", *Pearson Education,* 10/e., 2010.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", *Tata McGraw Hill*, edn , 2010.

Reference Books:

1. K. Uma Rao, "Basic Electrical Engineering", *Pearson Education,* edn, 2011.
2. Chakravarthy A, Sudhipanath and Chandan Kumar, "Basic Electrical Engineering", *Tata McGraw Hill Ltd*, edn, 2009.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

BASIC ELECTRICAL ENGINEERING LAB

Class: I/IV B.Tech., I Semester **Branch: Common to all**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks:25
0	0	2	1	External Marks:50

1. Verification of KVL, KCL
2. Transient response of R-L, R-C, R-L-C circuits with DC excitation
3. Verification of Thevenin's Theorem
4. Verification of Norton's Theorem
5. Verification of Maximum Power Transfer Theorem
6. Determination of internal resistance and internal inductance of choke coil
7. Resonance in RLC series circuit
8. Speed control of DC Shunt motor
9. Open Circuit and Short Circuit Test on single phase Transformer.
10. Performance characteristics of 3 phase squirrel cage induction motor
11. Demonstration of components of LT switchgear

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SEMESTER – I
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ENGINEERING GRAPHICS

Teaching Scheme				Examination Scheme
L	T	P	c	Internal Evaluation -30
1	0	4	3	External Evaluation -70

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their ignificance, Usage of Drawing Instruments, Lettering. Conic Sections including the Rectangular Hyperbola – General method only Cycloid,Epicycloid and Hypocycloid, Scales – Plain, Diagonal and vernier.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

UNIT – IV

Isometric Projections: Principles of Isometric Projection – Isometric Scale , Isometric Views ,Conventions , Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions.

UNIT – V

Development of Surfaces: Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

Introduction to CAD: (For Internal Evaluation Weightage only)

Introduction to Auto CAD Commands, Draw Tools,Modify Tools, Text, Dimension Properties, DIMENSION, PROPERTIES tool bar, Standard Tool bar, LAYERS.

TEXTBOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing / M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: Syllabus must be complete in 48 theory hours, however theory hours may be converted in to equal practical hours as per credits

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

ENGINEERING MECHANICS

Teaching Scheme :					Examination Scheme :	
L	**T**	**P**	**C**		Internal Evaluation :	30 marks
3	1	-	4		End Semester Exam :	70 marks

Course Learning Objectives (LOs):

LO1: develop concept of force, reactions, principles of force and their application on engineering structures and machines
LO2: introduce various kinds of statically determinate pin jointed structures and methods of analysing the trusses
LO3: understand the importance of geometric centre, cross sectional areas of plane lamina and moment of inertia
LO4: understand the behavior of particles in motion subjected to system of forces.

UNIT – I (6+2)

Laws of Mechanics: Parallelogram law of forces, triangle law of forces, Newton's law of gravitation, law of superposition and transmissibility of forces.

Force Systems: Types of forces, co-planar, concurrent and parallel forces, moment and couple, free body diagram, resultant of force systems, resolution of forces, composition of forces, equilibrium equations of forces, Lami's theorem, Varignon's theorem, moment equilibrium equations, types of supports, beams and loadings, statically determinate structures, resultant and equilibrium of general force system.

UNIT –II (8+2)

Friction: Introduction, classification, laws of friction, coefficient of friction, angle of friction, ladder friction and wedge friction.

Plane Trusses: Rigid truss, stability and determinacy conditions, basic assumptions for a perfect truss, analysis of trusses by method of joints and method of sections of a cantilever and simply supported statically determinate pin-jointed trusses.

UNIT– III (8+2)

Centroid: Centroid of one dimensional figures, centroid of simple figures from first principles, centroid of composite sections.

Moment of Inertia: Moment of inertia of plane sections from first principles, theorems of moment of inertia – parallel axis theorem and perpendicular axis theorem, moment of inertia of standard sections and composite sections.

UNIT - IV (8+2)

Kinematics: Introduction to dynamics, rectilinear motion of a particle – displacement, velocity and acceleration, motion with uniform acceleration and motion with variable acceleration, curvilinear motion- rectangular components, components, acceleration of normal and tangential acceleration, projectile motion.

UNIT - V (8+2)

Kinetics: Rectilinear motion-equations of rectilinear motion, equations of dynamic equilibrium, D'Alembert's principle, curvilinear motion-equations of motion in rectangular components, tangential and normal components, equations of dynamic equilibrium, applications of work-energy, impulse –momentum principles of rectilinear motion and curvilinear motion.

Text Books:

- Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers,* New Delhi, 14th edn., 2014.

Reference Books:

- Timoshenko S., Young D.H., Rao J.V., and Sukumar Pati, "Engineering Mechanics in SI units", *McGraw Hill Education Pvt. Ltd.,* New Delhi, 5th edn., 2013.

- Bhavikatti S.S., "Engineering Mechanics", *New Age International,* New Delhi, 4th edn., 2013 (reprint).

- Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press,* 9th edn., 2013.

- Vijay HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" Kumar Reddy K., Suresh Kumar J. "Singer's Engineering Mechanics Statics and Dynamics" *BS Publications / BSP Books*, 3rd edn. (SI Units), 8th Reprint, 2014