BBS College of Engineering and Technology Prayagraj
Lecture Plan

Department	Mechanical Engineering Department
Program/Year/Semester/Sec	B.Tech/2025/ **6th**
Course Name/ Course Title	B.Tech/ **TOM**
Course Code	**BME 603**
Name of Faculty	Mr Saurabh Kumar
Department of Faculty	Mechanical Engineering Dept.

Pre-requisites for the Course	Students should have interest in learning basic of mechanical engineering.
	Student should have interest in learning of electric vehicle and Internal combustion engine and fluid machineries like pump and turbine.

Type of Course	Theory/Lecture
Contact hours	**50** hrs

Course Outcomes (COs)	
At the end of this course students will demonstrate the ability to:	
CO1	Understand the principles of kinematics and dynamics of machines.
CO2	Calculate the velocity and acceleration for 4-bar and slider crank mechanism
CO3	Develop cam profile for followers executing various types of motions
CO4	Apply the concept of gear, gear train and flywheel for power transmission
CO5	Apply dynamic force analysis for slider crank mechanism and balance rotating & reciprocating masses in machines.
CO6	Apply the concepts of gyroscope, governors in fluctuation of load and brake & dynamometer in power transmission

Unit	**Topic & sub – topic**	**Topics Covered**	**COs**	**Lectures proposed**	**Lecture delivered**	**Date**	**No. of students present (53)**	**Sign. of faculty**
	Unit-1 Introduction:							
	Introduction, mechanisms and machines, kinematics and kinetics, types of links, kinematic pairs and their classification		CO1	2				
	types of constraint, degrees of freedom of planar mechanism, Grubler's equation, mechanisms		CO1	2				
	inversion of four bar chain, slider crank chain and double slider crank chain		CO1	2				
	Velocity analysis: Introduction, velocity of point in mechanism		CO1	2				
	relative velocity method, velocities in four bar mechanism, instantaneous center.		CO1	2				
	Acceleration analysis: Introduction, acceleration of a point on a link, acceleration diagram		CO1	2				
	Corioli's component of acceleration, crank and slotted lever mechanism,.		CO1	2				
				14				
2	**Unit-2**							
	Cams: Introduction, classification of cams and followers, cam profiles for knife edge		CO2	2				
	roller and flat faced followers for uniform velocity, uniform acceleration		CO2	2				
	Gears and gear trains: Introduction, classification of gears, law of gearing		CO2	2				

	tooth forms and their comparisons, systems of gear teeth, length of path of contact, contact ratio, minimum number of teeth on gear and pinion to avoid interference		CO2	2				
	simple, compound, reverted and planetary gear trains, sun and planet gear train.		CO2	2				
				10				
3	**Unit-3**							
	Force analysis: Static force analysis of mechanisms, D'Alembert's Principle		CO3	2				
	standards for exchange images- Open Graphics Library (OpenGL)		CO3	2				
	dynamics of rigid link in plane motion, dynamic force analysis of planar mechanisms, piston force and crank effort		CO3	2				
	Turning moment on crankshaft due to force on piston, Turning moment diagrams for single cylinder double acting steam engine		CO3	2				
	four stroke IC engine and multi-cylinder engines, Fluctuation of speed, Flywheel		CO3	2				
				8				
4	**Unit-4**							
	Balancing: Introduction, static balance, dynamic balance, balancing of rotating masses, two plane balancing,		CO4	2				
	Graphical and analytical methods, balancing of reciprocating masses, balancing of single cylinder engine.		CO4	2				
	Governors: Introduction, types of governors, characteristics of centrifugal governors		CO4	2				
	gravity controlled and spring controlled centrifugal governors, hunting of centrifugal governors			2				
	inertia governors. Effort and Power of governor		CO4	2				
	ship stabilization, stability of four wheel and two wheel vehicles moving on curved paths.			**10**				
5	**Unit-5**							
	Brakes and dynamometers: Introduction, Law of friction and types of lubrication, types of brakes, effect of braking on rear and front wheels of a four wheeler		CO5	2				
	dynamometers, belt transmission dynamometer, torsion dynamometer, hydraulic dynamometer		CO5	2				
	Gyroscope: Space motion of rigid bodies, angular momentum, gyroscopic couples, gyroscopic stabilization,		CO5	2				
	ship stabilization, stability of four wheel and two wheel vehicles moving on curved paths.		CO5	2				
				8				
	Total Lectures			**50**				

Text Books & References	
	Theory of Machines: S.S. Rattan, McGraw Hill
	Theory of Machine-Dr R.S Khurmi by S.Chand
	Theory of Mechanisms and Machines: Amitabh Ghosh and Ashok Kumar Mallik, Third Edition Affiliated East-West Press.
	Theory of Machines: Thomas Bevan, CBS Publishers.

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Comments	

BBS College of Engineering and Technology Prayagraj
Lecture Plan

Department	Mechanical Engineering Department
Program/Year/Semester/Sec	B.Tech/2025/ **4th**
Course Name/ Course Title	B.Tech/ **CAD/CAM**
Course Code	**BME 602**
Name of Faculty	Mr Saurabh Kumar
Department of Faculty	Mechanical Engineering Dept.

Type of Course	Theory/Lecture
Contact hours	42 hrs

Course Outcomes (COs)	
At the end of this course students will demonstrate the ability to:	
CO1	Able to explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics.
CO2	Able to explain the fundamentals of geometric modeling, parametric curves, surfaces And Solids.
CO3	Summarize the different types of Standard systems used in CAD.
CO4	Able to apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines
CO5	Understand the different types of techniques used in Cellular Manufacturing and FMS

Unit	**Topic & sub – topic**	**Topics Covered**	**COs**	**Lectures proposed**	**Lecture delivered**	**Date**	**No. of students present (54)**	**Sign. of faculty**
	Unit-1 Introduction:							
	Product cycle- Design process- sequential and concurrent engineering- Computer aided design		CO1	2				
	CAD system architecture- Computer graphics – co-ordinate systems- 2D and 3D transformations homogeneous coordinates		CO1	2				
	Line drawing -Clipping- viewing transformation-Brief introduction to CAD and CAM – Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM –CAD/CAM concepts		CO1	2				
	Types of production– Manufacturing models and Metrics– Mathematical models of Production Performance		CO1	2				
				8				
2	**Unit-2 Geometric modeling:**							
	Representation of curves- Hermite curve- Bezier curve		CO2	2				
	- B-spline curves-rational Curves		CO2	2				
	Techniques for surface modeling – surface patch-Coons and bi-cubic patches-Bezier and B-spline surfaces		CO2	2				
	Solid Modeling techniques-CSG and B-rep		CO2	2				
				8				
3	**Unit-3 Cad standards:**							
	Standards for computer graphics- Graphical Kernel System (GKS)		CO3	2				
	standards for exchange images- Open Graphics Library (OpenGL)		CO3	2				
	Data exchange standards–IGES, STEP, CALS		CO3	2				

	etc.							
	–communication Standards		CO3	2				
			CO3					
				8				
4	**Unit-4 Fundamental of CNC and part programming.**							
	Introduction to NC systems and CNC – Machine axis and Co-ordinate system-		CO4	2				
	- CNC machine tools- Principle of operation		CO4	2				
	CNC- Construction features including structure-DrivesandCNCcontrollers-2D and 3D Machining on CNC-Introduction of Part Programming		CO4	2				
	Detailed Manual part programming on Lathe & Milling machines using G code sand M codes-Cutting Cycles,			2				
	Loops, Sub program and Macros- Introduction of CAM package.			2				
				10				
5	**Unit-5 Cellular manufacturing and flexible manufacturing system (FMS)**							
	Group Technology (GT), Part Families–Parts Classification and coding–Simple Problems in Opitz Part Coding system		CO5	2				
	–Production flow Analysis–Cellular Manufacturing–Composite part concept		CO5	3				
	Types of Flexibility–FMS–FMS Components – FMS Application & Benef		CO5	3				
	FMS Planning and Control– Quantitative analysis in FM		CO5	2				
				8				
	Total Lectures			**42**				

Text Books & References	
	E Zimmer M Groover. CAD/CAM Computer Aided Design and Manufacturing, Pearson, 2014
	V. Rajaraman. Computer Oriented Numerical Methods, PHI Learning, 4th Edition, 2019.
	Tiago Franco, Beatriz Costa, Maria Grilo. Product Design Process, Imaginary Cloud Limited, 2019.

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BBS College of Engineering and Technology Prayagraj
Lecture Plan

Department	Mechanical Engineering Department
Program/Year/Semester/Sec	B.Tech/2025/ 4th
Course Name/ Course Title	B.Tech/ **Engineering Mechanics and strength of Material**
Course Code	**BME402**
Name of Faculty	Mr Saurabh Kumar
Department of Faculty	Mechanical Engineering Dept.

Type of Course	Theory/Lecture
Contact hours	**60 hrs**

Course Outcomes (COs)	
At the end of this course students will demonstrate the ability to:	
CO1	Understand the force systems and application of force equilibrium to various two-dimensional problems.
CO2	Understand the construction details and working of internal combustion engines, electric vehicle and hybrid vehicles.
CO3	Determine the principal stresses and strains in structural members
CO4	Understand and determine the stresses, slope, and deflection of the transversely loaded members
CO5	Apply the concepts of stresses and strain in solving problems related to springs, buckling of columns and thin and thick cylinders

Unit	**Topic & sub – topic**	**Topics Covered**	**COs**	**Lectures proposed**	**Lecture delivered**	**Date**	**No. of students present (57)**	**Sign. of faculty**
	Unit -1: Introduction							
	All Newton's law		CO1	1				
	Review of two-dimensional force systems		CO1	1				
	Free body diagram		CO1	1				
	Equilibrium of force systems		CO1	1				
	laws of friction		CO1	1				
	equilibrium analysis of simple systems involving friction.		CO1	1				
	Trusses-Introduction, simple truss and solution of a simple truss,		CO1	1				
	methods of joints,		CO1	2				
	methods of sections.		CO1	2				
	Beam Introduction, shear force and bending moment		CO1	2				
	different equations of equilibrium		CO1	1				
	shear force and bending moment diagram for statically determined beams.		CO1	2				
				16				
2	**Unit-2: Centroid and moment of inertia:**							
	Centroid of plane, curve, area, volume and composite bodies,		CO2	1				
	moment of inertia of plane area,		CO2	1				
	parallel axis theorem, perpendicular axis theorem		CO2	2				
	concept and importance of principal moment of inertia.		CO2	1				
	Compound stress and strains:		CO2	1				
	Introduction, normal stress and strain, shear stress and strain,		CO2	1				
	stress on inclines sections, state of plane stress,		CO2	1				
	principal stress and strain, maximum shear stress,		CO2	1				

	Mohr's circle for plane stress,		CO2	1				
	theories of failure, strain energy, impact loads and stresses,		CO2	1				
	thermal Stresses, introduction to three-dimensional stresses.			1				
				12				
	Unit-3: Stresses in Beams:							
	: Pure Bending, normal stresses in beams		CO3	1				
	shear stresses in beams due to transverse and axial loads		CO3	2				
	composite beams.		CO3	2				
	cantilever and simply supported beams		CO3	1				
3	Macaulay's method,		CO3	2				
	area moment method, fixed and continuous beams.		CO3	1				
	Torsion: Torsion, combined bending and torsion of solid and hollow shafts		CO3	2				
	torsion of thin-walled tubes.			1				
				12				
	Unit-4: Helical and Leaf Springs:							
	: Deflection of springs, helical springs under axial load and under axial twist (for circular cross sections),		CO4	1				
	axial load and twisting moment acting simultaneously both for open and closed coiled springs		CO4	1				
	concept of laminated springs.		CO4	1				
4	**Columns and Struts:**		CO4	2				
	Buckling and stability			1				
	slenderness ratio, combined bending and direct stress, middle third and middle quarter rules,		CO4	2				
	struts with different end conditions, Euler's theory for pin-ended columns		CO4	2				
	effect of end conditions on column buckling, Ranking Gordon formulae.		CO4	2				
				12				
	Unit-5: Thin cylinders & spheres:							
	Introduction, difference between thin-walled and thick-walled pressure vessels, thin-walled spheres and cylinders,		CO5	2				
	hoop and axial stresses and strain, and volumetric strain.		CO5	2				
5	Thick cylinders: Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, compound cylinders,		CO5	2				
	stresses in rotating shafts and cylinders, stresses due to interference fits.		CO5	2				
				8				
	Total Lectures			**60**				

Text Books & References	
	Engineering Mechanics by S.S Bhavikatti,
	Engineering Mechanics by Dr D.S Kumar
	Mechanics of solid by R.K Rajput
	. Gere, Mechanics of Materials, Cengage learning.
	Bere, Johnston, Mechanics of Materials, McGraw Hill.

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