Semester 4

B. Tech 2nd year(4th Semester) Mechatronics

Course No.	Course Title	Teaching Schedule				Allotment Marks				Duration of Exam
		L	T	P	Total	Sessional	Theory	Practical	Total	
MT – 202	Computer Aided Design and Manufacturing	3	1	-	4	50	100	-	150	3
MT – 204	Electronic Principles	3	1	-	4	50	100	-	150	3
MT – 206	Design Basics	3	1	-	4	50	100	-	150	3
MT – 208	Software for Engineers	3	1	-	4	50	100	-	150	3
HUM-201 E/ MATH-201E	Basics of Economics & Management/ Mathematics IIIrd	3	1	-	4	50	100	-	150	3
MT – 210	Theory of Machines-II	3	1	-	4	50	100	-	150	3
MT – 212	Electronic Principles Lab	-	-	2	2	25	-	25	50	3
MT – 214	Software for Engineers Lab	-	-	2	2	25	-	25	50	3
MT – 216	Computer Aided Design and Manufacturing Lab	-	-	2	2	25	-	25	50	3
MT- 218	Theory of Machines-II lab	-	-	2	2	50	-	50	100	3
	Total	18	6	8	32	425	600	125	1150	

Students are allowed to use single memory, non-programmable scientific calculator during examination.

MT - 202

Computer Aided Design and Manufacturing

L	T	P	
3	1	-	

Sessional: 50 Marks
Theory: 100 Marks
Total: 150 Marks
Exam Duration: 3 Hours

PURPOSE
To expose the learner to the fundamentals of CAD/CAM and the concepts and techniques used in CAD and CAM.

INSTRUCTIONAL OBJECTIVES
1. Understand the fundamentals of CAD/CAM
2. Understand the graphics display techniques in 2D/3D view of various mechanical components.
3. Create solid modeling of various components.

UNIT I

INTRODUCTION TO CAD/CAM
Fundamentals of CAD / CAM, product cycle and CAD/CAM, Basic components of CIM, Distributed communication system, Computer networks for manufacturing, Role of computer in CAD/CAM. Benefits of CAD/CAM. Concurrent Engineering, Design for Manufacturability

UNIT II

SOLID MODELING AND GRAPHICS SYSTEM
Geometric modeling - wire frame, Surface and Solid models - CSG and B-Rep techniques - Wire frame versus Solid modeling - Introduction the software Configuration of Graphics System, Functions of Graphics Packages, Graphic standards - Introduction to Finite Element Analysis.

UNIT III

CNC MACHINES
Basic principles of numerical control; Methods of coding, Computer Numerical Control (CNC) System, Machine Structure, drive system, CNC programming, Machining centre, CNC Tooling. Direct Numerical control (DNC), Adaptive control machining systems: Adaptive control optimization, Adaptive control constraints.

UNIT IV

COMPUTER AIDED PLANNING SYSTEMS
Principle of computer integrated manufacturing, Approaches to Computer aided Process Planning (CAPP) - Generative and Retrieval CAPP systems, benefits of CAPP, Material Requirement Planning (MRP), mechanism of MRP, Capacity Planning, Computer integrated production planning and control, Shop floor control.

Suggested Reading:

TEXT BOOKS
1. Sadhu Singh. "*Computer Aided Design and Manufacturing*", Khanna Publishers, New Delhi, 1998.
2. Ibrahim Zeid, CAD/CAM, "*Theory and Practice*", Tata McGraw Hill Ed, 1998.
3. David F. Rogers and Alan Adams. J, "*Mathematical Elements for Computer Graphics*", McGraw - Hill Publishing Company International Edition, 1990.
4. William M. Newman, Robert F.Sproull, "*Principles of Interactive Computer Graphics*", McGraw-Hill International Book Company, 1984.
5. Groover and Zimmers, CAD/CAM; "*Computer Aided Design and Manufacturing, Prentice*" Hall of India, New Delhi, 1994.
6. Groover.M.P, "*Automation Production systems and Computer Integrated Manufacturing, Prentice*" - Hall of India Pvt. Ltd., New Delhi, 1996.

REFERENCES
1. Paul G. Ranky, "*Computer Integrated Manufacture, Prentice*" – Hall International, UK, 1986.
2. Radha Krishnan.P and Kothandaraman.C.P, "*Comuter Graphics and Design*", Dhanpat Rai and sons, New Delhi, 1991.
3. Radha Krishnan.P and Subramanian.S, "*CAD/CAM/CIM*", Wiley Eastern Ltd, New Age International Ltd., 1994

Note:-

Examination :- The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Assignment :- Assignment based upon learning outcomes, as mention below, will be set by lecturer where the student will be required to achieve the LO's as mentioned below. The assessment of assignment will be done based upon the learning made by the student.

Learning outcomes(LO's)

1) Apply basic draughting /layout techniques.	Application
2) Use a 3d cad package.	Application
3) Demonstrate a knowledge of concept of manufacturing techniques and Assemblies.	Knowledge & Understanding
4) Apply basic modelling techniques.	Application
5) Use a range of visual, oral and written presentation techniques.	Communication Team working

MT-204

Electronic Principles

L	T	P	
3	1	-	

Sessional: 50 Marks
Theory: 100 Marks
Total: 150 Marks
Exam Duration: 3 Hours

UNIT-I

P-N JUNCTION DIODE: - P-N junction and its characteristics, the load line concept, Applications: half-wave and full-wave rectifiers, capacitor-filter circuit, clipping and clamping circuits. Special Diodes: Zener diode, Schottky barrier diode, Varactor diode, Photodiode, Light emitting diode

REGULATED POWER SUPPLIES: - Concept of DC Power supply, line and load regulations, three terminal IC regulators, SMPS.

UNIT-II

TRANSISTORS: - Review of BJT and its characteristics, variation of operating point and stability. Transistor as amplifier, small signal equivalent circuit and Hybrid pi model, Emitter follower, Miller's theorem, R-C coupled amplifier, Multistage amplifier. Transistor Biasing: fixed bias, emitter bias with and without emitter resistance, limitations on BJT'S (at high frequency), Large signal model: Ebers-Moll Model. Large Signal Amplifier: Class A and Class B.

UNIT-III

FEEDBACK OSCILLATORS AND POWER AMPLIFIERS: - basic principles and types of feedback in amplifiers. Effect of feedback, Sinusoidal Oscillators: Use of positive feedback, Barkhausen's criterion, Different oscillator circuits-tuned collector, Hartley Colpitts, phase shift,Wien's bridge, and crystal oscillator.

MULTIVIBRATORS: Concept of multi-vibrator: astable, monostable, and bistable and their applications, IC555.

UNIT-IV

FIELD EFFECT TRANSISTORS: - JFET, pinch-off voltage, Volt-ampere characteristics, small signal model, MOSFET-Enhancement & Depletion mode, V-MOSFET, MOSFET amplifiers: C-S Amplifiers, C-D Amplifiers, C-D Amplifier. Biasing of JFETS and MOSFETS.

TEXT BOOKS:

1. Integrated Electronics: Millman & Halkias; Mc Graw Hill. 2. Electronic circuit analysis and design (Second Edition): D.A. Neamen; TMH

REFERENCE BOOKS:

1. Electronics Principles: Malvino; Mc Graw Hill. 2. Electronics circuits: Donald L. Schilling & Charles Belove: Mc Graw Hill. 3. Electronics Devices & Circuits: Boylestad & Nashelsky; Pearson.

Note:-

Examination :- The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Assignment :- Assignment based upon learning outcomes, as mention below, will be set by lecturer where the student will be required to achieve the LO's as mentioned below. The assessment of assignment will be done based upon the learning made by the student.

Learning outcomes(LO's)

1. Solve a range of problems in electronic principles choosing an appropriate solution Procedure and making use of the underlying concepts and principles	Enquiry, Knowledge & Understanding
2. Interpret qualitative and quantitative data in electronic principles relating to Practical work and communicate the results of the work by written reports and Presentations, incorporating structured coherent argument	Application and Team working

MT-206

Design Basics

L	T	P	
3	1	-	

Sessional: 50 Marks
Theory: 100 Marks
Total: 150 Marks
Exam Duration: 3 Hours

UNIT I

Kinematics of simple vibrating motion, Simple harmonic motions, Vectorial representation of harmonic motion. Degree of freedom, Equations of motions, general solution of free vibration, Phase plane method

Damped free vibration, undamped and damped forced vibrations, Vibrating isolation, Vibrating instruments.

UNIT II

Undamped free vibration ,Principle modes , Influence coefficients, Coordinate coupling, Orthogonality, Vibration absorbers.

Geometric method, Stability of equilibrium points, Method of harmonic balance.

Influence coefficients, Dunkerleys equation, Matrix iteration, Holzer method, Rayleigh method, and Rayleigh-Ritz method.

Unit III

Bending & shear Stresses in Beams: Bending stresses in beams with derivation & application to beams of circular, rectangular, I,T and channel sections, composite beams, shear stresses in beams with derivation combined bending torsion & axial loading of beams. Numericals.

Columns & Struts: Column under axial load, concept of instability and buckling, slenderness ratio, derivation of Eulers formulae for the elastic buckling load, Eulers, Rankine, Gordom's formulae Johnson's empirical formula for axial loading columns and their applications, eccentric compression of a short strut of rectangular & circular sections, Numerical.

Unit IV

Slope & Deflection : Relationship between bending moment, slope & deflection, Mohr's theorem, moment area method, method of integration, Macaulay's method, calculations for slope and deflection of (i) cantilevers and (ii) simply supported beams with or without overhang under concentrated load, Uniformly distributed loads or combination of concentrated and uniformly distributed loads, Numerical.

Fixed Beams: Deflections, reactions and fixing moments with SF & BM calculations & diagrams for fixed beams under (I) concentrated loads, (ii) uniformly distributed load and (iii) a combination of concentrated loads & uniformly distributed load.

REFERENCE AND TEXT BOOKS: -

- Mechanical vibration - By G.K. Grover; Nemchand Chand and Sons
- Mechanical Vibration – By Thomson; Prentice Hall
- Mechanical Vibration - By Den Hartog; Mc Graw Hill
- Introductory course to mechanical vibrations – By Rao and Gupta; Wiley Eastern
- Strength of Materials – G.H.Ryder, Third Edition in SI Units 1969 Macmillan, India.
- Mechanics of Materials – (Metric Edition) : Ferdinand P. Beer and E. Russel Johnston,
  Jr. Second Edition, McGraw Hill.
  - Book of Solid Mechanics – Kazmi, Tata Mc Graw Hill
- Strength of Materials – D.S. Bedi - S. Chand & Co. Ltd.
- Advanced Mechanics of Solids and Structures – N. Krishan Raju and D.R.Gururaje-Narosa Publishing House.
- Strength of Materials – Andrew Pytel and Fredinand L. Singer Fourth Edition, Int. Student Ed. Addison – Wesley Longman.

Note:-

Examination :- The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Assignment :- Assignment based upon learning outcomes, as mention below, will be set by lecturer where the student will be required to achieve the LO's as mentioned below. The assessment of assignment will be done based upon the learning made by the student.

Learning outcomes(LO's)

1) Solve a range of statistics, dynamics and/or kinematics problems and make use of the Underlying concepts and principles	Enquiry, Knowledge & Understanding
2) Interpret qualitative and quantitative data relating to practical work and Communicate the results of the work by written reports, incorporating structured Coherent argument	Application and Team working

MT - 208

Software for Engineers

L	T	P
3	1	-

Sessional: 50 Marks
Theory: 100 Marks
Total: 150 Marks
Exam Duration: 3 Hours

Unit-I

Overview of C Language: C Fundamental : Introduction to C, character set, identifiers, keywords, data types, constants, variable, user defined data types, arithmetic, unary, relational, logical, assignment and conditional operators & expression. Basic structure of a C program. Data I/O statement: single character I/O, formatted I/O, string I/O functions
.
.

Unit-II

Control Structure: Control Statement: sequencing, alteration (if-else, switch, break, continue,   go to, iteration, while, do-while, for) and nested loops
Pointers and Structures: Pointers: Character pointers, pointer to arrays, array of pointers. Structure and Unions: Defining and processing structure, Unions Preprocessor Directives
.

Unit-III

Functions : Defining and accessing a function, passing arguments to a function, specifying arguments data types, function prototypes, recursion. Storage Classes- Automatic, External, Static, Register.

Unit –IV

Maple: Solving problems of linear algebra **,**vectors Matrices, Determinants, Cayley Hamilton theorem, root of an algebraic equation , partial fraction, differential equation of single and higher order,

Text Book:
1.   Byron Gottfried , "Programming with C, Second edition, Schaum' s outline series" TMH

References:
1.   Tenenbaum, Y. Lanhghsam and A. J. Augenstein, "Data Structures Using C and C++", Prentice Hall of India, 1990.
2.   B.W. Kerrighan and D.M.Richie, " The C programming language", 2nd edition, PHI

Note:-

Examination :- The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Assignment :- Assignment based upon learning outcomes, as mention below, will be set by lecturer where the student will be required to achieve the LO's as mentioned below. The assessment of assignment will be done based upon the learning made by the student.

Learning outcomes(LO's)

1. Demonstrate an understanding of an algebraic mathematical package	Knowledge & Understanding
2. Use an algebraic mathematical package to solve problems analytically and Numerically.	Analysis, Application Problem solving
3. Use a programming language.	Application, Knowledge & Understanding Problem solving

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BASICS OF INDUSTRIAL SOCIOLOGY, ECONOMICS & MANAGEMENT

HUM – 201 E

L   T   P
3   1   -

Sessional : 50
Theory : 100
Total : 150
Duration of Exam. : 3 Hrs.

UNIT-I

Meaning of social change, nature of social change, theories of social change. The direction of social change, the causes of social change, the process of social change. Factors of social change – the technological factors, the cultural factors, effects of technology on major social institutions, social need of status system, social relations in industry.

UNIT-II

Meaning of Industrial Economic, Production Function, its types, Least Cost Combination, Law of Variable Proportion, Laws of Return – Increasing, Constant & Diminishing. Fixed & variable costs in short run & long run, opportunity costs, relation between AC & MC, U-shaped short run AC Curve. Price & Output Determination under Monopoly in short run & long run. Price Discrimination, Price Determination under Discriminating Monopoly. Comparison between Monopoly & Perfect Competition.

UNIT – III

Meaning of Management, Characteristics of Management, Management Vs. Administration, Management – Art, Science & Profession, Fayol's Principles of Management.Personnel Management – Meaning & Functions, Manpower – Process of Manpower Planning, Recruitment & Selection – Selection Procedure. Training – Objectives & Types of Training, Various Methods of Training. Labour Legislation in India – Main provisions of Industrial disputes Act 1947;

UNIT – IV

Marketing Management – Definition & Meaning, Scope of Marketing Management, Marketing Research – Meaning, Objectives. Purchasing Management – Meaning & Objectives, Purchase Procedure, Inventory Control Techniques. Financial Management – Introduction, Objectives of Financial decisions, Sources of Finance.

Note : Eight questions are to be set taking two from each unit. The students are required to attempt five questions in all, taking at least one from each unit.

TEXT BOOKS :
1. "Modern Economic Theory" Dewett, K.K., S. Chand & Co.
2. "Economic Analysis" K.P. Sundharam & E.N. Sundharam (Sultan Chand & Sons).
3. "Micro Economic Theory" M.L. Jhingan (Konark Publishers Pvt. Ltd.).
4. "Principles of Economics" M.L. Seth (Lakshmi Narain Aggarwal Educational Publishers – Agra).
5. "An Introduction to Sociology", D.R. Sachdeva & Vidya Bhusan.
6. "Society – An Introductory Analysis", R.M. Maclver Charles H. Page.
7. "Principles and Practices of Management : R.S. Gupta; B.D. Sharma; N.S. Bhalla; Kalyani.

REFERENCE BOOKS
1. "Organization and Management : R.D. Aggarwal, Tata McGraw Hill.
2. Business Organization and Management : M.C. Shukla

Theory of Machines-II
MT –210

| L | T | P | | Sessional: 50 Marks |
| 3 | 1 | - | | Theory: 100 Marks |

Total: 150 Marks
Exam Duration: 3 Hours

UNIT I

Types of gears, terminology, condition for correct gearing, cyclical and involutes profiles of gear teeth, pressure angle, path of contact, arc of contact, Interference, undercutting, minimum number of teeth, number of pairs of teeth in contact, helical, spiral, worm and worm gear, bevel gear. Gear trains; simple, compound, reverted, and epicyclical, Solution of gear trains, sun and planet gear, bevel epicyclical gear, compound epicyclical gear, pre-selective gear box, differential of automobile, torque in gear taints.

UNIT II

Types of brakes, friction brakes, external shoe brakes, band brakes, band and block brakes, internal expanding shoe brake, dynamometers; absorption, and tensional. Types of governors; watt, Porter, Proell, spring loaded centrifugal, Inertia, Sensitiveness, Stability, Isochronism's, Hunting, Effort and power of governor, controlling force, Static and dynamic balancing of rotating parts, balancing of I. C. Engines, balancing of multi-cylinder engine; V-engines and radial engines, balancing of machines.

UNIT III

Gyroscope, Gyroscopic couple and its effect on craft, naval ships during steering, pinching and rolling, Stability of an automobile (2-wheeers), Introduction, open and closed lop control, terms related to automatic control, error detector, actuator, amplification, transducers, lag in responses, damping, block diagrams, system with viscous damped output, transfer functions, relationship between open –loop and closed loop transfer function.

UNIT IV

Introduction, Terms Used in Vibratory Motion, Types of Vibratory Motion, Types of free Vibrations, Natural frequency of free Longitudinal Vibrations, Natural frequency of free Transverse Vibrations, Effect of Inertia of the Constraint in Longitudinal and Transverse Vibrations, Natural frequency of free Transverse Vibrations Due to a Point Load Acting Over a Simply Supported Shaft, Natural frequency of free Transverse Vibrations Due to Uniformly Distributed Load Over a Simply Supported Shaft, Natural frequency of free Transverse Vibrations of a Shaft fixed at Both Ends and Carrying a Uniformly Distributed Load, Natural frequency of free Transverse Vibrations for a Shaft Subjected to a Number of Point Loads.

Suggested reading:
1. Theory of machines: S. S. Rattan, Tata McGraw Hill Publications.
2. Theory of Mechanism and Machines: Jagdish Lal, Metropolitan Book Co.
3. Mechanism synthesis and analysis: A.H. Soni, McGraw Hill Publications.

4. Mechanism: J.S. Beggs.
5. Mechanics of Machines: P.Black, Pergamon Press.
6. Theory of Machines: P.L.Ballaney, Khanna Publisher

Note:-

Examination :- The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Assignment :- Assignment based upon learning outcomes, as mention below, will be set by lecturer where the student will be required to achieve the LO's as mentioned below. The assessment of assignment will be done based upon the learning made by the student.

Learning outcomes(LO's)

1) Understand about the uses of gear trains and brake, governors.
2) Understand and learn use of Gyroscope.
3) Understand and learn balancing of IC engines.
4) Understand vibrations (transverse and longitudinal)

MT-212

Electronic Principles Lab

L	T	P
-	-	2

Sessional: 25 Marks
Practical: 25 Marks
Total: 50 Marks
Duration of Exam: 3 Hrs

NOTE:

1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester.

2. At least 7 experiments/ jobs should be performed/ prepared from the below list, remaining three may either be performed/ prepared from the above list or designed & set by the concerned institution as per the scope of the syllabus of Electronic Principles and facilities available in the institute.

3. For Learning outcomes refer to Electronic Principles (MT-204).

List of Experiment

1. Measurement & study of P-N junction diode-I-V and C-V characteristics.
2. Study of Half-wave and Full-wave rectifier.
3. Measurement and study of solar cell –I-V characteristics.
4. Study of Active filters.
5. Study of diode as Clipper and Clamper.
6. Study of Zener diode as Voltage Regulator.
7. Measurement and study of Input and Output characteristics of a BJT.
8. Study of CE amplifier-Current & Power gains and Input, Output Impedances.
9. To study the frequency response of RC coupled amplifier.
10. Measurement and study of Output characteristics of JFET.
11. Measurement and study of Output characteristics of MOSFET.
12. Study of SCR/Thyristor characteristics.
13. Study of UJT characteristics.
14. Study of Push-Pull amplifier.

MT - 214

Software for Engineers lab

L	T	P	
-	-	2	

Sessional: 25 Marks
Practical: 25 Marks
Total: 50 Marks
Duration of Exam: 3 Hrs

NOTE:

1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester.

2. At least 7 experiments/ jobs should be performed/ prepared from the below list, remaining three may either be performed/ prepared from the above list or designed & set by the concerned institution as per the scope of the syllabus of Software for Engineers and facilities available in the institute.

3. For Learning outcomes refer to Software for Engineers (MT-208).

List of Experiment

1. Determinant of matrix, Rank of matrix
2. Eigen value &vector of matrix. Ad joint and inverse of matrix.
3. Characteristic and minimal polynomial of matrix.
4. Plot the graph in 2D and 3d of any function.
5. Solve algebraic equation
6. Find mean, median mode of given data set.
7. Find variance and standard deviation of given data set.

Text Book:

1. Byron Gottfried , "Programming with C, Second edition, Schaum' s outline series" TMH

References:

1. Tenenbaum, Y. Lanhghsam and A. J. Augenstein, "Data Structures Using C and C++", Prentice Hall of India, 1990.
2. B.W. Kerrighan and D.M.Richie, " The C programming language", 2nd edition, PHI

MT-216

Computer Aided Design and Manufacturing Lab

L	T	P
-	-	2

Sessional: 25 Marks
Practical : 25 Marks
Total: 50 Marks
Duration of Exam: 3 Hrs

PURPOSE
To provide hands on experience on geometric modeling, assembling and drafting using computers and also on part programming.

INSTRUCTIONAL OBJECTIVES
1. Draw various views of a component assembly.
2. Model the components.
3. Assemble the components.
4. Manufacture small components using CNC lathe and mill.

NOTE:

1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester.

2. For Learning outcomes refer to **Computer Aided Design and Manufacturing** (MT-202).

List of Experiments/ jobs

CAD LABORATORY

1. Computer Aided Drafting of Machine Elements Orthographic views - Isometric Views - Sectional views. Dimensioning - Annotations - symbols - welding - surface finish - threads. Text - Bill of Materials - Title Block. Script writing.
2. **Exercise:** Knuckle joint, Gib and Cotter Joint, Screw jack, Footstep bearing, Isometric views with their orthographic views.
3. Geometric modeling of machine components Protrusion - cut - sweep – draft and loft - Modify /edit pattern - Transformation - Boolean operation
4. **Exercise:** Individual parts of universal joint - Flange coupling - Piston and Connecting rod. (Using a popular commercial package)
5. Design any ten entities/machine parts (e.g. Plumber block, Steam stop valve, tail stock, drill machine, universal testing machine, screw jack, bench vice, press die assembly, clamp assembly, flywheel, surface grinder, bevel gear, rack and pinion gear) in 2D and 3D with PRO-E design software/ any other suitable software.
6. Assemble the designed entities/machine parts (e.g. Plumber block, Steam stop valve, tail stock, drill machine, universal testing machine, screw jack, bench vice, press die assembly, clamp assembly, flywheel, surface grinder, bevel gear, rack and pinion gear) to understand the assembly operations in design software.

CAM LABORATORY

1. Manual programming for CNC machines using standard G and M codes CNC Lathe - Part programming for Turning, Facing, Chamfering, Step turning, Taper turning circular interpolation. CNC Milling machine - Part programming for PTP motions, Line motions, Contour motions, Pocketing - Circular, Rectangular and Mirror commands.
2. Part programming using fixed / canned cycles. Drilling, Peck Drilling, Boring, Tapping, Thread cutting
3. Simulation of Tool Path for different operations
4. Machining of small components using CNC Lathe and CNC Milling Machine
5. To study the characteristic features of CNC machine.

6. Part programming (in word address format) experiment for turning operation (including operations such as grooving and threading) and running on CNC machine.

7. Part programming (in word address format or ATP) experiment for drilling operation (point to point) and running on CNC machine.

Recommended books:

1. Engineering Drawing with CAD Applications, D Ostrowsky, 1997, ISBN: 0340706023
2. CADCAM Theory and Practice, I Zeid, 1991, ISBN 0-07-072857-7
3. Pro/Engineer Wildfire, Louis Gary Lamit, 2003, ISBN 0534400833
4. Pro/ENGINEER Wildfire for Designers, Sham Tickoo, Cadcim Technologies, 2003, ISBN 0966353765

Theory of Machines-II lab
MT 218

L T P
- - 2

Sessional: 50 Marks
Practical : 50 Marks
Total: 100 Marks
Duration of Exam: 3 Hrs

NOTE:

1. At least ten experiments/ jobs are to be performed/ prepared by students in the semester.

2. At least 7 experiments/ jobs should be performed/ prepared from the below list, remaining three may either be performed/ prepared from the above list or designed & set by the concerned institution as per the scope of the syllabus of Dynamics of Machine and facilities available in the institute.

3. For Learning outcomes refer to Theory of Machines-II (MT-210).

LIST OF EXPERIMENT
1. To determine experimentally, the moment of inertia of a flywheel and axle compare with theoretical values.
2. To find out critical speed experimentally and to compare the whirling speed of a shaft with theoretical values.
3. To find experimentally the Gyroscopic couple on motorized gyroscope and compare with applied couple.
4. To calculate the torque on a planet carrier and torque on internal gear using epicyclic gear train and holding torque apparatus.
5. To study the different types of centrifugal and inertia governors and demonstrate any one.
6. To study the automatic transmission unit.
7. To study the differential types of brakes.