# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## SCHEME OF TEACHING AND EXAMINATION

## B.E. IV SEMESTER MECHANICAL ENGINEERING

| S. No. | Board of Study | Sub. Code | SUBJECT | PERIODS PER WEEK | | | SCHEME OF EXAM Theory/Practical | | | TOTAL MARKS | Credit L+(T+P)/2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | ESE | CT | TA | | |
| **1.** | Mech. Engg. | 337411 ( 37) | Computer Graphics | 4 | 1 | - | 80 | 20 | 20 | 120 | 5 |
| **2.** | Mech. Engg. | 337412 (37) | Mechanics of Solids – II | 4 | 1 | - | 80 | 20 | 20 | 120 | 5 |
| **3.** | Mech. Engg. | 337413 (37) | Applied Thermodynamics | 4 | 1 | - | 80 | 20 | 20 | 120 | 5 |
| **4.** | Mech. Engg. | 337414 (37) | Kinematics of Machines | 4 | 1 | - | 80 | 20 | 20 | 120 | 5 |
| **5.** | Mech. Engg. | 337415 (37) | Mechanical Measurements & Metrology | 4 | 1 | - | 80 | 20 | 20 | 120 | 5 |
| **6.** | Mech. Engg. | 337416 (37) | Manufacturing Science - I | 3 | 1 | - | 80 | 20 | 20 | 120 | 4 |
| **7.** | Mech. Engg. | 337421 (37) | Computer Graphics Lab | - | - | 2 | 40 | - | 20 | 60 | 1 |
| **8.** | Mech. Engg. | 337422 (37) | Thermodynamics Lab | - | - | 2 | 40 | - | 20 | 60 | 1 |
| **9.** | Mech. Engg. | 337423 (37) | Kinematics of Machines Lab | - | - | 2 | 40 | - | 20 | 60 | 1 |
| **10.** | Mech. Engg. | 337424 (37) | Mechanical Measurements & Metrology Lab | - | - | 2 | 40 | - | 20 | 60 | 1 |
| **11.** | Humanities | 300425 (46) | Health, Hygiene & Yoga | - | - | 2 | - | - | 40 | 40 | 1 |
| **12.** | | | Library | - | - | 1 | - | - | - | - | - |
| | | | **Total** | 23 | 6 | 11 | 640 | 120 | 240 | 1000 | 34 |

**L – Lecture, T – Tutorial,**
**P – Practical, ESE- End Semester Exam , CT- Class Test,**
**TA – Teacher's Assessment**

Note (1) : Duration of all theory papers will be of **Three Hours.**

Note (2) : Industrial Training of six weeks is mandatory for B.E. student. It is to be completed in two parts. The first part will be in summer after IV sem. after which students have to submit a training report which will be evaluated by the college teachers during B.E. V sem.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*
## SCHEME OF TEACHING AND EXAMINATION

| | | | |
|---|---|---|---|
| **Semester :** | **B.E. IV Semester** | **Branch :** | **Mechanical Engineering** |
| **Sub :** | **Computer Graphics** | **Code :** | **337411 (37)** |
| **Total Theory Periods :** | **48** | **Total Tutorial Periods : 12** | |
| **Total Marks in End Semester Exam : 80** | | | |
| **Minimum number of class tests to be conducted : 02** | | | |

**UNIT - I**

**Introduction,**

Application Areas. Input and Output Devices:- Keyboard, Mouse,Z mouse Trackball, Joysticks, Data Glove, Digitizers, Light pen, Touch Panels, Image scanners, Printers and Plotters. Video Display Devices: Refresh CRT; Raster & Random scan display; Color CRT monitor; Flat panel display; Co-ordinate representation.

**UNIT - II**

**Basic Raster Graphics Algorithm for drawing 2-D primitives**

Output Characteristics: Aspect ratio; Aliasing and Anti-aliasing. Line Drawing Algorithms: DDA algorithm; Bresenham's algorithm. Circle Generation Algorithm: Midpoint circle algorithm. Ellipse Generation Algorithm: Mid-point ellipse algorithm. Area filling: Inside-outside test; Boundary fill algorithm- 4 and 8 connected area; flood-fill algorithm.

**UNIT - III**

**2-D Geometric Transformation**

Window and View port: Window and View port relationship; World co-ordinates; Normalized device co-ordinates and Homogenous co-ordinates. Basic Transformations: Translation; Rotation and Scaling. Other Transformation: Reflection and Shear. Composite Transformation.

**UNIT - IV**

**2-D Viewing and Clipping**

Viewing world coordinates system, normalized coordinate system, device, image coordinate system, window definition, view port definitions, viewing transformation. Clipping: Point clipping; Line: Cohen-Sutherland algorithm, Mid-point Polygon.

**UNIT - V**

**3-D Concepts and curves**

3-D Display Methods: Parallel and Perspective projections; 3-D Transformation: Basic Transformations: translation, rotation and scaling

**Curves**

Spline Representation, Bezier Curves single and multiple segements , Cubic-spline.and their parametric forms

**TEXT BOOKS**

1. Donald Hearn and M. Pauline Baker- Computer Graphics with C version - Low Price Edition, 2nd Edition, 2002.
2. Computer graphics – N. Krishnamurthy –TMH

**REFERENCE BOOKS**

1. Rogers and Adams - Mathematical Elements for Computer Graphics – TMH
2. Xiang and Plastok - Schaum's Outlines Computer Graphics - TMH, 2nd Edition, 2002.
3. Harrington - Computer Graphics - McGraw Hill
4. Rogers, "Procedural Elements for Computer Graphics – TMH
5. Cad Cam Theory and Practice by Ibrahim Zeid - TMH publications

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

**B.E. IV Semester** **Branch : Mechanical Engineering**

**Semester :**

**Sub : MECHANICS OF SOLIDS – II** **Code : 337412 (37)**

**Total Theory Periods : 48** **Total Tutorial Periods : 12**

**Total Marks in End Semester Exam : 80**

**Minimum number of class tests to be conducted : 02**

**UNIT-I**

**Energy Methods**:

Introduction, principles of superposition, strain energy, reciprocal relations, Maxwell Betti theorem, elastic strain energy relation in tension and compression, strain energy in beams subjected to bending and shaft to torsion. impact loading in tension and bending, first theorem of Castigliano and its applications

**UNIT- II**

**Fixed Beams**

Fixed beam subjected to different types of loads and couples, calculations of fixing moments and reactions at supports, deflection, effect of sinking of support.

**Continuous beams**

Continuous beams subjected to different type of loads and couples, beams with overhang, beams with one end fixed, Clapeyron's theorem, effect of sinking of supports

**UNIT-III**

**Bending of curved bars**

Bending of curved bars in plane of loading, Winkler Bech theory, crane hooks, chain links, bending of curved beams built in its initial plane, bending of circular bars subjected to symmetric loading, bending of circular rings, stresses in circular rings

**UNIT-IV**

**Unsymmetrical Bending**

Introduction to unsymmetrical bending, stresses due to unsymmetrical bending, deflection of beam due to unsymmetrical bending, shear center for angle, channel, and I-sections

**Columns**

Short Column (Strut), Eccentric loading on Strut, Stability of columns, Euler's formula for different end conditions, equivalent load, eccentric loading, Rankine's formula.

**UNIT – V**

**Pressure Vessels**

Thin Pressure Vessels circumferential and longitudinal stresses in thin cylindrical shells and thin spherical shell under internal pressure,

Stresses in thick and compound cylinders.

**TEXT BOOKS**


1. Strength of Material – Dr. Sadhu Singh – Khanna Publishers
2. Elements of Strength of Material – Timo Shenko & Young – EWP Press
3. Strength of Material – R.K. Rajput – Dhanpat Rai & Sons


**REFERENCE BOOKS**


1. Strength of Material – Rider – ELBS
2. Mechanics of Material – F.P. Bear & E.E. Johnston – McGraw Hill
3. Mechanics of Material – J.M. Gera & Time Shenko – CBS Publishers
4. Introduction to Solid Mechanics – I. H. Shames – PHI
5. Engineering Mechanics of Solids – E.P. Popov – PHI
6. Strength of Material – Shaums Outline Series – McGraw Hill

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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|---|---|---|---|---|---|
| **Semester** | **:** | **B.E. IV Semester** | **Branch** | **:** | **Mechanical Engineering** |
| **Sub** | **:** | **APPLIED THERMODYNAMICS** | **Code** | **:** | **337413 (37)** |
| **Total Theory Periods** | **:** | **48** | **Total Tutorial Periods** | **:** | **12** |

**Total Marks in End Semester Exam : 80**

**Minimum number of class tests to be conducted : 02**

**UNIT - I**

**Second Law Analysis**

Introduction to the second law of Thermodynamics, the Clausius inequality, entropy, principle of increase in entropy, T-ds relation.

Availability – Second law analysis of Closed system, second law analysis of steady –flow system, Irreversibility.

**UNIT - II**

**Thermodynamic Relationships**

Helmholz and Gibbs functions, coefficient of Volume expansion and isothermal compressibility, Differential relations of internal energy, Maxwell's Relation, $C_p$ $C_v$ relations, T-ds equations, Clapeylon equation, Kelving coefficient.

**Equation of state:**

Ideal gas equation of state, Real gas deviation with ideal gas, Vander waals equation, evaluation of its constants, Virial expansions, limitations of the equation. The law of corresponding states.

**UNIT – III**

**Vapour and Vapour Power Cycle**

Properties and processes in ideal vapour, use of steam tables and Mollier's diagram in determination of steam properties, energy and entropy calculations.

Carnot and Rankine cycle as applied to steam power plants, Reheat cycle, ideal regenerative cycle, practical regenerative cycle, characteristics of ideal working fluids, binary vapour cycle.

**Steam Condensers**

Various types of condenser efficiency, vacuum efficiency and measurement. Effect of air leakage, Thermodynamic analysis.

**Unit – IV**

**Refrigeration Cycle**

Reversed Carnot cycle, simple vapour compression refrigeration cycle, Analysis with T-S diagram.

**Reciprocating Air Compressors**

Classification of air compressors, Advantages, disadvantages of reciprocating compressors, working of reciprocating compressor, equation of work (with & without clearance) volumetric efficiency, multistage compressors, efficiency of compressor, Effect of atmospheric condition on output of Compressors, Thermodynamic analysis of reciprocating compressor, Intercooler & External cooler.

**Unit – V**

**Thermodynamics of Compressible Fluids**

Isentropic flow, stagnation conditions, stagnation enthalpy, temperature, pressure, density, flow through available area, duct, converging nozzle, Convergent divergent nozzle, operation of convergent divergent nozzle for different back pressures. Flow with friction and heat transfer, Fanno flow, Rayleigh flow. Flow of steam through nozzle, throat area for maximum discharge, supersaturated Flow in nozzle.

**TEXT BOOKS**


1. Engineering Thermodynamics – P.K. Nag – TMH Publishers
2. Thermodynamics & Thermal Engineering – J. Selwin Rajadurai – New Age International Publishers


**REFERENCES BOOKS**


1. Thermodynamics – C.P. Arora – TMH Pub.
2. Thermal Science & Engineering – D.S. Kumar – S.K. Kataria & Sons
3. Thermodynamics – S.C. Gupta – Pearson Education
4. Thermodynamics- An Engineering Approach – Cengal & Boles – McGraw Hill
5. Engineering Thermodynamics – K. Ramakrishna – Anuradha Agencies

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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|---|---|---|---|---|---|
| **Semester** | **:** | **B.E. IV Semester** | **Branch** | **:** | **Mechanical Engineering** |
| **Sub** | **:** | **KINEMATICS OF MACHINES** | **Code** | **:** | **337414 (37)** |
| **Total Theory Periods** | **:** | **48** | **Total Tutorial Periods** | **:** | **12** |

**Total Marks in End Semester Exam : 80**

**Minimum number of class tests to be conducted : 02**

**UNIT- I**

**Relative Velocity**

Elements, pairs, mechanisms, four bar chain and its inversions, velocity diagrams, Relative velocity method, instantaneous center method.

**UNIT- II**

**Relative Acceleration**

Synthesis of Mechanism, pantograph, lower pair mechanisms, relative acceleration diagram, Klien's construction, Coroilis Component of acceleration.

**UNIT - III**

**Cams:**

Classification of cams and followers, nomenclature of a radial cam, description of follower movement, displacement diagrams, uniform and modified uniform motion, simple harmonic motion, uniform acceleration motion and its modifications, cycloidal motion, synthesis of cam profile by graphical approach, considerations of pressure angle, cams with specified contours: circular arc cam & tangent cam.

**UNIT- IV**

**Gear and gear trains**

Gear terminology, law of gearing, gear tooth forms, standard involute and cycloid tooth profile, interference and undercutting of involute teeth, minimum number of teeth on pinion to avoid interference, types of gears

**Gear trains**

Simple, compound, reverted, and epicyclical gear trains, tabular/analytical/graphical/vector method for computation of velocity ratio in gear trains

**UNIT-V**

**Friction**

Friction in turning pairs, application of friction circles in slider crank and four bar mechanisms; pivot and collar friction, thrust bearings.

**Brakes and Dynamometers**

Simple block and shoe brake, band brake, band and block brake, and internal expanding shoe brake; absorption dynamometers, transmission dynamometers.

**TEXT BOOKS**


1. Theory of Machine- S.S.Rattan - TMH.
2. Theory of Machine – P.L. Ballaney – Khanna Publishers
3. Theory of Machines – J. E. Shigley – McGraw Hill


**REFERENCE BOOKS**


1. Theory of Mechanisms and Machines- A. Ghosh, A. K. Mallik – EWP Press
2. The Theory of Machines - Thomas Bevan, - CBS Publishers
3. Mechanisms and Machine Theory - J. S. Rao, R. V. Dukkipati - Wiley Eastern Limited

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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|---|---|---|---|---|---|
| **Semester** | **:** | **B.E. IV Semester** | **Branch** | **:** | **Mechanical Engineering** |
| **Sub** | **:** | **MECHANICAL MEASUREMENTS & METROLOGY** | **Code** | **:** | **337415 (37)** |

**Total Theory Periods : 48** **Total Tutorial Periods : 12**

**Total Marks in End Semester Exam : 80**

**Minimum number of class tests to be conducted : 02**

**UNIT - I**

**Generalized Measurement System**

Introduction - Introduction to measurement and measuring instruments, Generalized measuring system and functional elements, units of measurement, static and dynamic performance characteristics of measurement devices, calibration, concept of error, sources of error, statistical analysis of errors sensors and Transducers – Types of sensors, type of transducers and their characteristics.

**UNIT - II**

**Measurement**

Measurement of displacement and angular velocity. Measurement of pressure: Gravitational direct acting, elastic and indirect type pressure transducers. Measurement of very low pressure – Mcleod gauge and Pirani gauge.

**Measurement of Strain**

Type of strain gauges and their working, strain gauge circuits, Mcleod guage, Pirani guage, temperature compensation. Strain rosettes. Measurement of force and torque. Measurement of temperature by thermometers, bimetallic, thermocouples, thermistors and pyrometers-total radiation and optical pyrometry.

**UNIT- III**

**Measurement of flow**

Obstruction meters, variable head meters, hot wire and magnetic meters, ultrasonic flow meters. Vibration and noise measurement : Seismic instruments, vibration pick ups and decibel meters.

**Data acquisition system**

Introduction to data acquisition systems, single and multi channel systems, microprocessors and PC based data acquisition systems. Input – output devices signal transmission and Processing. Devices and systems.

**UNIT- IV**

**Metrology**

Standards of measurement. Linear and angular measurement devices and systems limit gauges, gauge blocks. Measurement of geometric forms like straightness, flatness, roundness and circularity, principles and application of optical projectors, tool makers, microscope, autocollimators etc.

**UNIT- V**

**Metrology**

Principle and use of interferometry. Comparators, Measurement of screw threads and gears. Surface texture measurement.

**TEXT BOOKS**


1. Mechanical Measurements and Control – D.S. Kumar – S.K. Kataria & Sons
2. Mechanical Measurements – G. Beckwith Thomas G. – Pearson Education


**REFERENCES BOOKS**


1. Measurement Systems, Application Design – E.O. Deoblein - McGraw Hill
2. Engineering Metrology – K.J. Hume - MacDonald and Company
3. Engineering Metrology – I.C. Gupta - Dhanpat Rai & Sons
4. Mechanical & Industrial Measurements – R.K. Jain – Khanna Publishers

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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| **Semester** | **:** | **B.E. IV Semester** | **Branch** | **:** | **Mechanical Engineering** |
| **Sub** | **:** | **Manufacturing Science - I** | **Code** | **:** | **337416 (37)** |
| **Total Theory Periods** | **:** | **40** | **Total Tutorial Periods** | **:** | **10** |

**Total Marks in End Semester Exam : 80**

**Minimum number of class tests to be conducted : 02**

**UNIT – I**

**Introduction to Manufacturing Processes**:
Importance of manufacturing processes, classification, economic and technological definitions of manufacturing processes.

**Foundry**

**Pattern making** - Types, material, allowances, colour codes, core – types, materials and its properties.
**Mould Making -** Types of sand moulding, design considerations, moulding machines & moulding procedure, moulding sand – types, properties, composition and applications.
**Casting -** Procedure, Melting furnaces, casting defects,
**Special Casting Processes -** Investment casting, centrifugal casting, shell moulding, $CO_2$ moulding, slush casting, die casting.

**UNIT – II**

**Welding**
Principles of Welding, survey and allied processes
**Arc Welding**
Power Source and Consumable, MMAW, TIG and MIG processes and their parameter selection, atomic hydrogen welding, welding of cast iron, welding electrode – types, composition, specification.
**Resistance Welding**
Principle, equipment and processes.

Thermit Welding, brazing & soldering, Internal and external welding defects, Inspection & testing of weld.

**UNIT – III**

**Powder Metallurgy**
Powder Manufacturing, compacting and sintering processes, Advantages, limitations and applications of powder metallurgy .
**Manufacturing of Plastic Components**
Advantages, application and principle of the following processes, extrusion, injection moulding, compression moulding, transfer moulding, blow moulding .

**UNIT – IV**
**Machine Tools**
**Lathe**
Introduction, type, specification, construction, work holding devices & tools, mechanism and attachments for various operations, taper turning, thread cutting operations on Lathe, capston and turret lathe.
**Shaper**
Introduction, type, specification, Quick return Mechanisms, Table feed mechanism, work holding devices, shaper operations
**Slotter & Planner**
Introduction, specification, types of drives, types of machines.
**Milling**

Introduction, specification, types, mechanisms and attachments for milling, milling operations, Indexing-simple, compound and differential.

**UNIT – V**

**Drilling**

Introduction, drill nomenclature, types of drilling machines, other operations like counter boring, counter sinking, spot facing etc.

**Reaming**

Introduction, description of reamers, type of reaming operations.

**Boring**

Introduction, types of boring machines, boring operations, boring tools

**Broaching**

Introduction, types of broaches, nomenclature of broach, types of broaching machines.

**Surface finishing operations**

Honing, lapping, super finishing, polishing, buffing, process parameters and attainable grades of surface finish.

**TEXT BOOKS**


1. Manufacturing Technology (Vol. – I & II) – P.N. Rao – Tata McGraw Hill Pub. Company, New Delhi
2. A Text Book of Production Technology(Manufacturing Processes) – P.C. Sharma – S. Chand and Company Ltd., New Delhi


**REFERENCE BOOKS**


1. Manufacturing Science – A. Ghosh & A.K. Mallik – East West Press Pvt. Ltd., New Delhi
2. Manufacturing Engineering and Technology – S. Kalpakjian & S.R. Schmid – Addision Wesley Longman, New Delhi
3. Production Technology – R.K. Jain – Khanna Publishers, New Delhi
4. A Text Book of Production Technology (Vol. I & II) – O.P. Khanna – Dhanpat Rai & Sons, New Delhi
5. Manufacturing Science – Paul DeGarmo

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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|---|---|---|---|---|---|
| **Semester** | **:** | **B.E. IV Semester** | **Branch** | **:** | **Mechanical Engineering** |
| **Sub** | **:** | **Computer Graphics Lab** | **Practical Code** | **:** | **337421 (37)** |

**Total Practical Periods : 20**

**Total Marks in End Semester Exam : 40**

## EXPERIMENTS TO BE PERFORMED (MINIMUM TEN NUMBERS)

1. To develop the concept of Computer Graphics in C
2. DDA Line drawing algorithm
3. Bresenham's Line drawing algorithm
4. Bresenham's Circle drawing algorithm
5. Mid point circle drawing algorithm
6. Bezier curve
7. Cohen Sutherland Clipping algorithm
8. Mid point clipping algorithm
9. Mid point Ellipse drawing algorithm
10. Matrix Multiplication
11. 2-D Transformation (Move, Rotate, Scale)
12. Cubic Spline

## LIST OF EQUIPMENTS/MACHINES REQUIRED

1. P-IV, 2.6 G. Hz., 128/256 MB SDRAM, 40 GB HDD, 1.44 MB FDD, 14" Colour Monitor, 52 X CD RW, Laser Scroll Mouse
2. Software Required – C & C++

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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| **Semester** | **:** | **B.E. IV Semester** | **Branch :** | **Mechanical Engineering** |
| **Sub** | **:** | **Thermodynamics Lab** | **Practical Code :** | **337422 (37)** |

**Total Practical Periods : 20**

**Total Marks in End Semester Exam : 40**

## EXPERIMENTS TO BE PERFORMED (MINIMUM TEN NUMBERS)

1. To study Mountings & Accessories of a Boiler.
2. To study the Cochran Boiler and it's Accessories and Mountings.
3. To study the Lancashire and it's Accessories and Mountings.
4. To study the Babcock Wilcox and it's Accessories and Mountings.
5. To study a Simple Steam Engine.
6. To study a Simple Steam Engine With D-Slide Valve.
7. To study a Compound Steam Engine.
8. To study Meyer's Expansion Valve of Steam Engine.
9. To study Drop Valve of Steam Engine.
10. To study Two Stroke Petrol Engine.
11. To study Four Stroke Petrol Engine.
12. Determination of vacuum efficiency and condenser efficiency of a surface steam condenser.
13. Performance and testing of steam jet condenser.
14. Study of Steam Turbines
15. Study of Reciprocating Compressor

## LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Cornish Boiler or its model with mountings and accessories.
2. Cochran Boiler or its model with mountings and accessories.
3. Lancashire Boiler or its model with mountings and accessories.
4. Babcock Wilcox Boiler or its model with mountings and accessories.
5. Reducing Valve
6. Expansion Steam Trap
7. Steam Injector
8. Green Economizer
9. Super Heater
10. Steam Engine With D-Slide Valve
11. Spring Loaded Safety Valve
12. Throttle Valve
13. Stop Valve Hopkin's Type
14. Blow Off Cock
15. Feed Check Valve
16. Lever Safety Valve
17. Dead Weight Safety Valve
18. Pressure Gauge
19. Fusible Plug
20. High Steam Low Water Safety Valve
21. Antipriming Pipe
22. Model of Two Stroke Petrol Engine
23. Model of Four Stroke Petrol Engine
24. Surface Steam Condenser experimental setup
25. Jet Condenser experimental setup
26. Reciprocating Compressor
27. Steam Turbine

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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| **Semester** | **:** | **B.E. IV Semester** | **Branch** | **:** | **Mechanical Engineering** |
| **Sub** | **:** | **Kinematics of Machines Lab** | **Practical Code** | **:** | **337423 (37)** |

**Total Practical Periods : 20**

**Total Marks in End Semester Exam : 40**

## EXPERIMENTS TO BE PERFORMED (MINIMUM TEN NUMBERS)

1. To determine the jump phenomena of cam follower apparatus.
2. To draw displacement, velocity and acceleration curve of cam motion.
3. To find out the load carrying capacity of bearing.
4. To find out the Coefficient of friction of bearing.
5. To find out the frictional horse power of bearing.
6. To find out the Pressure around the bearing by journal bearing apparatus.
7. To measure co-efficient of friction, power transmitted with varied belt tension by slip & creep apparatus.
8. To find out the percentage slip at fixed belt tension by varying load with slip & creep apparatus.
9. To find out belt slip and creep by slip and creep measurement apparatus.
10. To verify the coriolli's component of acceleration with theoretical and practical results.
11. To find the speed and torque of different gear in an epicyclic gear train.
12. To find the speed and torque of different gear in a simple, compound and reverted gear train.
13. Study and analysis of Pantograph.
14. To study Four-bar mechanism and its inversions.
15. To study internal expanding and external contracting shoe brakes.
16. To study rope brake dynamometer and calculation of torque and power.

## LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Cam analysis apparatus
2. Journal bearing apparatus.
3. Coriolli's component of acceleration apparatus
4. Slip & Creep Measurement Apparatus In Belt Drive
5. Simple, compound, reverted and epicyclic gear train apparatus.
6. Pantograph apparatus (with all accessories)
7. Internal / External shoe brake (complete set with accessories)
8. Four bar mechanism and its inversions.
9. Rope brake dynamometer apparatus (with all accessories)
10. Mechanoset.

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

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| **Semester** | **:** | **B.E. Fourth Semester** | **Branch** | **:** | **Mechanical Engineering** |
| **Sub** | **:** | **Mechanical Measurements & Metrology Lab** | **Practical Code** | **:** | **337424 (37)** |

**Total Practical Periods : 20**

**Total Marks in End Semester Exam : 40**

## EXPERIMENTS TO BE PERFORMED

### MEASUREMENT LAB TO BE PERFORMED (MINIMUM 7 NUMBERS)

1. To Measure Pressure Using Bourdon Pressure Gauge.
2. To Calibrate Pressure Gauge Using Dead Weight Pressure Gauge Tester.
3. To Measure Displacement Using LVDT
4. To Measure Temperature Using Thermister
5. To Measure Flow Rate Using Rotameter.
6. To Measure Angle Using Angular Sensor.
7. To Measure Torque Using Torque Transducer
8. To Measure Pressure Using Pressure Transducer.
9. To Measure Strain Using Strain Cantilever Beam.
10. To Measure Temperature Using RTD.
11. To Measure Temperature Using Thermo Couple.
12. To perform the following experiments using Data Acquisition System
    a) To measure Temperature by Themocouple
    b) To measure Temperature by Thermistor
    c) To measure Temperature by RTD.
    d) To measure Strain.

### METROLOGY LAB TO BE PERFORMED (MINIMUM 5 NUMBERS)

1. Measurements of lengths, heights, diameter by Vernier Calipers, Vernier Height Gauge, Micrometers.
2. Measurement of various angles using Bevel Protractor, Sine Bar & Combination Set.
3. Determining the accuracy of Electrical and Optical Comparator.
4. Determine the Surface Flatness and Contour using Interferometer.
5. Determine the Effective Diameter of screw threads by using Two wire & Three wire methods.
6. Measurement of Gear Elements using Profile Projector and image analyzer.
7. Measurement of Tool Angles of a Single Point Cutting Tool by using Tool Makers Microscope.
8. Calibration of Vernier Caliper, Micrometer, Height Gauge, Depth Micrometer using Slip Gauges.

## LIST OF EQUIPMENTS/MACHINES REQUIRED

| MEASUREMENT | METROLOGY |
|---|---|
| 1. Data Acquisition System | 1. Vernier Calipers |
| 2. Software compatible with DAS | 2. Vernier Height Gauge |
| 3. Displacement Measurement Tutor Using (LVDT) | 3. Depth Micrometers |
| 4. Pressure Measurement Tutor Using Pressure Transducer | 4. Set of Slip Gauges |
| 5. Strain Measurement Tutor Using Strain Cantilever Beam | 5. Interferometer |
| 6. Torque Measurement Tutor Using Torque Transducer | 6. Tool Makers Microscope |
| 7. Temperature Measurement Tutor Using RTD Sensor | 7. Profile Projector |
| 8. Temperature Measurement Tutor Using Thermocouple | 8. Bevel Protector |
| 9. Temperature Measurement Tutor Using Thermister | 9. Sine Bar |
| 10. Angular Measurement Tutor Using Angular Sensor | 10. Combination Set |
| 11. Rotameter Trainer Module | 11. Optical & Electrical Comparator |
| 12. Dead Weight Pressure Gauge Tester | 12. Optical Flats |
| 13. Bourdon Gauge Trainer | 13. Surface Plates |
| 14. Image Analyzer | 14. Dial Indicators |
| | 15. Snap and Ring Gauges (GO and NO-GO type) |

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

Semester : B.E. IV Sem.
Subject : **HEALTH, HYGIENE & YOGA**
No. of Periods : 2 pds/week
Total Marks in End Semester Exam. : NIL
Minimum number of class tests to be conducted: Two

Branch: Common for all branches
Code : 300425 (46)
Tutorial Periods : NIL
Teacher's Assessment: 40 Marks

## UNIT- I

**HEALTH & HYGIENE:** Concept of health, Physical health and mentall health and wellbeing and how to achieve these, longevity and how to achieve it, concept and common rules of hygiene, cleanliness and its relation with hygiene; Overeating and undereating, amount of food intake required, intermittent fasting; adequate physical labour, sleep; consumption of junk fast food vs nutritious food; fruits, vegetables cereals and qualities of each of these.

## UNIT- II

**INTRODRCTORY KNOWLEDGE OF COMMON STREAMS OF MEDICINAL CURE:** History, development, basic concepts, modes of operation of Alopathy, Ayurved, Homoeopathy, Biochemic, Unani, Siddha, Accurpressure, Accupunture, Naturopathy, Yogic and Herbal system of medicines, Introduction of Anatomy and Physiology concerned.

## UNIT- III

**YOGASANS:** Meaning and concept of Yoga, Yogasans and its mode of operation, How to perform Yogasans, Common Yogasans with their benefits, such as, Padahastasan, Sarvangasan, Dhanurasan, Chakrasan, Bhujangasan, Paschimottasan, Gomukhasan, Mayurasan, Matsyasan, Matsyendrasan, Pawanmuktasan, Vajrasan, Shalabhasan, Sinhasan, Shashankasan, Surya Namaskar, Halasan, Janushirasan, Utshep Mudra,

## UNIT- IV

**YOGASANS FOR COMMON DISEASES:** From Yogic Materia Medica with symptoms, causes, asans and herbal treatment.

- **Modern silent killers**: High blood pressure, diabetes and cancer, causes and cure; Common health problems due to stomache disorders, such as, indigestion, acidity, dycentry, piles and fissures, artheritis, its causes, prevention and cure.
- **Asans for relaxation:** Shavasan, Makarasan, Matsyakridasan, Shashankasan.
- **Asans to increase memory and blood supply to brain** : Shirsh padasan, Shashankasan.
- **Asans for eye sight**: Tratak, Neti Kriya .
- **Pranayam** : Definition and types : Nadi Shodhan, Bhastrik, Shitakari, Bhramari useful for students.

## UNIT V

**CONCENTRATION:** Concentration of mind and how to achieve it. Tratak ¼=kVd½] Concentration on breath, Japa ¼ti½] Ajapajap ¼vtikti½] internal silence ¼vUrekSZu½] visualization in mental sky ¼fpnkdk'k /kkj.kk½] Concentration on point of light ¼T;ksfr /;ku½] Concentration on feeling ¼Hkko /;ku½] Concentration on figure ¼ewÙkZ /;ku½-

**REFERENCES**


(1) Yogic Materia Medica
(2) Asan, Pranayam and Bandh


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