Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering   **Semester: IV**
Subject: Fluid Mechanics   **Code: B037412(037)**
Total Theory Periods: 40   **Total Tutorial Periods: 10**
Class Tests: Two (Minimum)   **Assignments: Two (Minimum)**
ESE Duration: Three Hours   **Maximum Marks: 100**   **Minimum Marks: 35**

Course Objectives:
Obtaining a solid understanding of the fundamentals of Fluid Mechanics
The ability to formulate basic equations for Fluid Engineering problems
The ability to use tables and figures to determine the friction energy loss for various pipes/ducts geometries and Fluid
    engineering applications
The ability to perform dimensional analysis and identify important parameters

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UNIT-I   **Properties of fluid:**Fluid, ideal and real fluid, properties of fluid : mass density, weight density, specific volume, specific gravity, viscosity, surface tension, capillarity, vapour pressure, compressibility and bulk modulus. Newtonian and non-Newtonianfluids
Fluid Statics: Pressure, Pascal'slaw, Hydrostatic law, Manometry , Hydrostatic force on submerged plane and curved surface, Buoyancy and Flotation.

UNIT-II Fluid Kinematics: Description of fluid motion, Langragian and Eulerian approach, Type of fluid flow, Type of flow lines-pathline,streakline,streamline,streamtube.Continuity equation, acceleration of a fluid particle, motion of fluid particle along curved path, Normal and tangential acceleration, Rotational flow, Rotation and Vorticity, circulation, stream and potential function, flow net, its characteristics and utilities. Liquid in relative equilibrium.

UNIT-III   **Fluid Dynamics:** Euler's Equation, Bernoulli's equation and its practical application, Venturi meter, Orifice meter, Nozzle, Pitottube.Impulsemomentumequation,MomentumofMomentumequation,KineticenergyandMomentum correctionfactor, Vortex motion, Radialflow.

UNIT-IV Laminar Flow: Reynold's experiment, flow of viscous fluids in circular pipe, shear stress and pressure gradient relationship, Velocity distribution, Hagen-Poiseuille Equation, flow of viscous fluids between two parallel plates(Counter flow) shear stress and pressure gradient relationship, Velocity distribution, Drop of pressure head.
Turbulent flow: Effect of turbulence, Expression for loss of head due to friction in pipes (Darcy-Weisbach equation), Expression for co-efficient of friction in terms of shear stress.
Flow through pipe: Loss of energy in pipes, Hydraulic gradient and total energy line, pipe in series and parallel, equivalent pipe power transmission through pipe, water hammer in pipes.

UNIT-V   **Dimensional Analysis:** Methods of dimensional analysis, Rayleigh's method, Buckingham's theorem,Limitations.
Model analysis: Dimensionless number and their significance, model laws, Reynolod's model law, Fraude's model law, Euler'smodel law, Weber's model law, Mach's model law, Type of models, scale effect in model, limitation of hydraulic similitude.

Text Books:
1.   Fluid Mechanics and Fluid Power Engineering –D.S. Kumar–Kataria& Sons–NewDelhi
2.   A text of Fluid Mechanics –R. K. Rajput – S. Chand & Company Ltd.,Delhi

Reference Books:
1.   Fluid Mechanics & HydraulicsMachines-R.K.Bansal-LaxmiPublications.,Delhi
2.   Engineering Fluid Mechanics –K.L. Kumar,Eurasia Publication House,Delhi
3.   Mechanics of Fluid –B.S. Massey–English Language Book Society(U.K.)
4.   Fluid Mechanics-Yunush A. Cengel, JohnM.Cimbala-TMH,Delhi
5.   Introduction to Fluid Mechanics and Fluid Machines –S.K. Som and G. Biswas-TMH,Delhi
6.   Hydraulics and Fluid Mechanics Including Hydraulic Machine-PN Modi,& SM Seth-Standard,Delhi
7.   Theory and Application of FluidMechanics-K.Subramanya-TMHDelhi

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Course Outcomes:
Apply knowledge of Fluid Mechanics formulating and solving engineering problems.
Acquire knowledge of fluid mechanics for the design and development of mechanical systems.
Demonstrate creativeness in designing new systems components and processes in the field of engineering and mechanical
    engineering in particular.
Identify, analysis, and solve mechanical engineering problems useful to the society.
Work effectively with engineering and science teams as well as with multidisciplinary designs.
Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application.
Develop fundamentals to continue the study of the advance subject fluid machinery, Heat and mass transfer etc.

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch:AutomobileEngineering   **Semester:IV**
Subject:AutomotiveChassis   **Code: B037414(082)**
Total TheoryPeriods:40   **Total Tutorial Periods:10**
Class Tests:Two(Minimum)   **Assignments: Two (Minimum)**
ESE Duration:ThreeHours   **MaximumMarks:100**   **Minimum Marks:35**

COURSE OBJECTIVES
The ability to know the basics of Automobile Chassis Components.
The ability to know the Construction and Working principle of Front Axle, Rear Axle, Wheels, Tyres, Final Drive, Steering
System.
The ability to Braking system in automobiles
The ability to Suspension System Wheels and Tyres.

UNIT-I
INTRODUCTION
Types of chassis layout with reference to power plant locations and drive, Vehicle frames. Various types of frames. Constructional details,
Materials. Testing of vehicle frames. Unitized frame body construction: Loads acting on vehicle frame.

UNIT-II
FRONT AXLE AND STEERING SYSTEM
Types of front axles.Construction details.Materials.Front wheel geometry viz. Castor, Camber, King pin inclination, Toe-in-Conditions for true
rolling motion of wheels during steering, turning radius, Wheel wobble and shimmy. Ackerman and Davis steering system Constructional
details of steering linkages. Different types of steering gear boxes. Steering linkages and layouts for conventional and independent suspension
system. Power and power assisted steering.

UNIT-III
DRIVE LINE, REAR AXLE, FINAL DRIVE, AND DIFFERENTIAL
Effect of driving thrust and torque reactions. Hotchkiss drive, torque tube drive and radius rods. Propeller shaft.Universal joints.Constant
velocity universal joints. Front wheel drive. Construction of rear axles. Types of loads acting on rear axles. Full floating.Three quarter
floating and semi floating rear axles. Rear axle housing. Construction of different types of axle housings.Multi axled vehicles. Construction
details of multi drive axle vehicles. Different types of final drive. Double reduction and twin speed final drives. Differential principles.
Constructional details of differential unit. Non-slip differential.Differential lock-Differential housing.

UNIT-I^V
SUSPENSION SYSTEM
Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar
springs-Independent suspension -Rubber suspension –Pneumatic suspension–HydroElasticsuspension-
Shockabsorbers.Vibrationanddrivingcomfort.

UNIT-V
BRAKING SYSTEM, WHEELS AND TYRES
Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory.Determination of braking
torque. Brake actuating systems -Mechanical, Hydraulic and Pneumatic – Detailed study of components. Parking and engine exhaust brakes.
Factors influencing brake performance. Power and power assisted brakes. Antilock Braking System (ABS).
Types of wheels - construction.Function of tyres- Solid and pneumatic Tyres. Constructional details of pneumatic tyres.

TEXTBOOKS
1. Automotive Chassis-Brakes, Steering and Suspension, Tim Gilles, Thomson Delmer Learning,2005
2. Automotive Chassis,-HeldtP.M.,ChiltonCo.,NewYork,1990.

REFERENCEBOOKS
1. Automotive Braking Systems-Birch, Thomson Asia,1999.
2. Automotive Chassis Systems- Birch, Thomson Asia, 2000.
3. Automotive Suspension and Steering Systems- Birch, ThomsonAsia,1999.
4. TheMotorvehicle,SAE-Newton,Steeds&Garrot,Butterworths,India,13thedition,2001.
5. Mechanism of the car- Judge A.W.Chapman and Halls Ltd., London,1986

Course Outcomes:
Acquire knowledge and hands-on competence in applying the concepts of auto chassis in the design and
development of automobiles.
DemonstratecreativenessindesigningnewsystemscomponentsandprocessesinthefieldofAutomobile Engineering.
Identify, analysis, and solve automobile engineering problems useful to the society

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch:AutomobileEngineering   **Semester:IV**
Subject:Applied Thermodynamics   **Code: B037411(037)**
Total TheoryPeriods:40   **Total Tutorial Periods:10**
Class Tests:Two(Minimum)   **Assignments: Two (Minimum)**
ESE Duration:ThreeHours   **MaximumMarks:100** **Minimum Marks:35**

COURSE OBJECTIVES

To understand the applications of engineering thermodynamics in real life situations
To perform gas power cycle analysis
To perform vapour power cycle analysis
To analyze steam condenser, cooling pond and cooling towers.

To analyze thermodynamic system with compressible fluid.

UNIT-I
Gas power cycles: An over view of reciprocating engine, Air standard cycle, Otto, Diesel, Dual cycle-Description and representation on P-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures, comparison of cycles. An overview (only p-v and T-s diagram) of Stirling, Erricson, Atkinson and Lenoircycle

UNIT-II
Reciprocating Air Compressors: Classification of air compressors, working of single acting single cylinder reciprocating compressor, single acting reciprocating compressor without clearance, single acting reciprocating compressor with clearance-equation of work, volumetric efficiency. Multi-stage reciprocating air compressors, advantage of multi-stage compression, two stage air compressor-minimum work, Indicator diagram, mean effective pressure and indicated power, compressor power, efficiencies, shaft power of the compressor, Advantages and limitations of reciprocating compressors.

UNIT-III
Vapour Power Cycle: Simple steam power cycle, Rankine cycle; p-v, T-s and h-s diagrams, efficiency, steam rate, heat rate. Comparison of Rankine and Carnot cycles, mean temperature of heat addition, reheat cycle, ideal regenerative cycle, practical regenerative cycle, Feed Water Heaters (FWH)-open and closed FWH, characteristics of ideal working fluids, binary vapour cycle

UNIT-IV
Steam Condensers: The function of condenser, Element of a water cooled condensing unit, types of condenser, advantages and disadvantages of various types of condenser, condenser vacuum, mass of circulating water required, source of air its effects and removal, vacuum efficiency, condenser efficiency
Cooling ponds and cooling tower: Cooling pond, cooling towers, classification and working principles.

UNIT-V
Thermodynamics of Compressible Fluids: Velocity of pressure waves in a fluid, Mach number, isentropic stagnation state, stagnation enthalpy, temperature, pressure, density, one dimensional steady isentropic flow, are a velocity relationship, critical properties-choking in isentropic flow, dimensionless velocity, Effect of back pressure on the performance of nozzle flow. Flow of steam through nozzle, throat area for maximum discharge, supersaturated Flow in nozzle.

TextBooks:
1. Thermodynamics-An Engineering Approach– Cengal& Boles –McGraw Hill,Delhi
2. Engineering Thermodynamics –P.K. Nag –TMHPublishers

ReferenceBooks:
1. Fundamental of engineering thermodynamics-R.Yadav ,CPH,Allahabad
2. Thermal Science & Engineering –D.S. Kumar –S.K. Kataria&Sons
3. Fundamental of Thermodynamic- Claus Borgnakke, Richard E. Sonntag,Wiley,Delhi
4. An Introduction to Thermodynamics-Y.V.C.Rao ,UniversityPrass, Hyderabad
5. Thermodynamics &Thermal Engineering –J. SelwinRajadurai –New Age InternationalPublishers
6. Thermodynamics –C.P. Arora – TMH ,Delhi
7. Thermodynamics –S.C. Gupta –PearsonEducation,Delhi

Course Outcomes:
Apply knowledge of classical thermodynamics for formulating and solving engineering problems.
Acquire knowledge and hands-on competence in applying the concepts of thermal sciences in the design and development of mechanical systems.
Demonstrate creativeness in designing new systems components and processes in the field of Engineering general and mechanical engineering in particular.

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering   **Semester: IV**
Subject: Kinematics of Machines   **Code: B037415(037)**
Total Theory Periods: 40   **Total Tutorial Periods: 10**
Class Tests: Two (Minimum)   **Assignments: Two (Minimum)**
ESE Duration: Three Hours   **Maximum Marks: 100** **Minimum Marks: 35**

Course Objectives:
To synthesis, both graphically and analytically, multilink mechanisms.
To perform mechanism analyses to find the position, velocity, acceleration, and dynamics of multi-bar mechanisms.
To synthesis mechanism to perform certain prescribed task/motion
To analyze gear trains.
To analyze thrust bearings, Brakes and dynamometers.

UNIT-I   Relative velocity: Elements, pairs, Mechanism, Four bar chain and its inversion, Velocity diagrams, Relative velocity method, Instantaneous centremethod.

UNIT-II Relative Acceleration: Synthesis of mechanism, Pantograph, Lower pairmechanism, Relative acceleration diagram, Kliens construction, Coroillis component ofacceleration.

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: Types of gears, Gear terminology, Law of gearing, Gear tooth forms, Involute and Cycloid tooth profile, Interference and under cutting of Involutes teeth, Minimum number of teeth on pinion to avoid interference.
Gear trains: Simple, Compound, Reverted, and Epicyclical gear trains, computation of velocity ratio in gear trains by different methods.

UNIT-V   (a)Friction: Applications of friction, Pivot and collar friction, Thrustbearing.
(b) Belt-Drives: Ratio of tensions for flat belt &V-belt, Centrifugal tension, condition for maximum power transmission.
(c)Brakes and dynamometer: Simple block and shoe brake, Band brake, Band and block brake, and internal expanding shoe brake, Absorption dynamometer, Transmissiondynamometer.

TextBooks:
1.   Theory of Machine–S.S.Ratan-TataMcGrawHill.
2.   The Theory ofMachine–ThomasBeven–CBSPublishers.

ReferenceBooks:
1.   Theory of mechanism and machine–A.Ghosh,A.K.Mallik–EWPPress.
2.   Theory of Machine–Shigley,JE
3.   Theory of Machine-JagdishLal
4.   Theoryofmachine–J.E.Singh–McGrawHill.

Course Outcomes:
Apply knowledge of Kinematics of machine for understanding, formulating and solving engineering problems.
Acquire knowledge and hands-on competence in applying the concepts kinematics of machine in the design and development of mechanical systems.
Demonstrate creativeness in designing new systems components and processes in the field of engineering.
Identify, analysis, and solve mechanical engineering problems useful to the society.
Work effectively with engineering and science teams as well as with multidisciplinary designs.

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering   **Semester: IV**
Subject: Automotive Diesel Engines   **Code: B037413(082)**
Total Theory Periods: 40   **Total Tutorial Periods: 10**
Class Tests: Two (Minimum)   **Assignments: Two (Minimum)**
ESE Duration: Three Hours   **Maximum Marks: 100**   **Minimum Marks: 35**

Course Objectives:
To study classifications of internal combustion engine.
To understand how and why actual cycles deviate from air standard cycle and fuel-air cycle.
To understand combustion in Compression ignition engine.
To impart knowledge about fuel injection, super charging and turbo charging.
To impart knowledge about testing and performance of Diesel Engine

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UNIT-I   **Basic theory:** Diesel engine construction and operation, two stroke and four stroke diesel engine, dual cycle engines, diesel cycle, fuel-air and actual cycle analysis, diesel fuel ,ignition quality, Cetane number, diesel fuels standards and specifications.

UNIT-II   **Fuel injection system:** Types of fuel injection system, Requirements, air and solid injection, functions of components, jerk and distributor type pumps common rail system, PTFI system pressure waves, injection lag, unit injector, mechanical and pneumatic governors, fuel injector, types of injection nozzle, spray characteristics, injection timing, pump calibration.

UNIT-III   **Air motion, combustion and combustion chambers:** Importance of air motion, swirl, squish and turbulence, swirl ratio, fuel air mixing, stages of combustion, delay period, factors affecting delay period, knock in CI engines. Combustion chamber: design requirements, direct and indirect injection combustion chambers, M t ypecombustion chamber. Introduction-Inlet Manifold, Construction with reference toEfficiency.

UNIT-IV   **Super charging and turbo-charging:** Necessity and importance of super charger, types of super charging and turbo charging, relative merits, design of Turbo charger Variable Geometrical Techniques, exhaust gas re -circulation, charge cooling &Lubrication.

UNIT-V   **Diesel engine testing and performance:** Automotive and stationary diesel engine testing and related emission standards. Engine performance and emission characteristics, variables affecting engine performance and emission, methods to improve engine performance, heat balance, performance maps. Engine management systems, CRDI, etc., Performance, emission, Calculation & Testing of Emissions, Heat ReleaseAnalysis

TEXTBOOKS
1. A Course in Internal CombustionEngines–M.L.Mathur&R.P.Sharma–DhanpatRai&Sons
2. Internal CombustionEngine–V.Ganeshan–TMH

REFERENCESBOOKS
1. A Course in Internal CombustionEngine–V.M.Domkundwar–DhanpatRai&Sons
2. Internal CombustionEngine–R.Yadav–CentralPublishingHouse,Allahabad
3. Fundamentals of Internal Combustion Engine–PaulW.Gill,JamesH.Smith,EugeneJ.Ziurys–Oxfordand
   IBH PublishingCompany
4. Internal Combustion Engines–R.K.Rajput–LaxmiPublications

Course Outcome:
Demonstrate a basic understanding of C.I. Engine design, function and performance.
Acquire knowledge and hands-on competence in the design and development of mechanical systems.
Work effectively with engineering and science teams as well as with multidisciplinary designs.
Demonstrate an understanding of the relationships between the design of the internal combustion engine and environmental issues

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch:AutomobileEngineering   **Semester:IV**
Subject: Fluid Mechanics Lab   **Code :B037421(037)**
Total LabPeriods:24   **Batch Size:30**
MaximumMarks:40   **Minimum Marks:20**

List of Experiments:(At least Ten experiments are to be performed by each student)

1. To determine the meta-centric height of a shipmodel.
2. To verify Bernoulli'sTheorem.
3. To verify Impulse MomentumPrinciple.
4. To calibrate a Venturi meter and study the variation of co-efficient ofdischarge.
5. To calibrate anorifice-meter.
6. Experimental determination of critical velocity inpipe.
7. To determine of head loss in various pipefittings.
8. Flow measurement using Pitottube.
9. To study the transition from laminar to turbulent flow and to determine the lower critical Reynold'snumber.
10. To determine the hydraulic coefficients (C_c, C_d and C_v)of anorifice.
11. To determine the coefficient of discharge of amouth-piece.
12. To obtain the surface profile and the total head distribution of a forced vortex.
13. To study the velocity distribution in pipe and to compute the discharge by integrating velocityprofile.
14. To study the variation of friction factor for pipeflow.
15. To determine the roughness co-efficient of an openchannel.

List of Equipment/Instruments/Machines/Software Required:

Apparatus for determination of meta centric height

Bernoulli's apparatus

Impact of jet apparatus

Venturi meter

Orifice meter

Pipe friction apparatus

Orifice apparatus

Mouth Piece apparatus with the provision for determination of hydraulic coefficient C_c, C_d &C_v

Vortex flow apparatus

Apparatus of head loss in various pipe

fittings.Reynold's apparatus

Complete set up for flow measurement using Pitot tube

Complete set for open channel apparatus

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch:AutomobileEngineering   **Semester:IV**
Subject: Automotive Petrol &Diesel EnginesLab   **Code: B037422(082)**
Total LabPeriods:24   **Batch Size:30**
MaximumMarks:40   **Minimum Marks:20**

List of Experiments (Minimum Six experiments and Four studies are to be performed by each student)

1. Study of IC Engine. (Engine components, material used and enginenomenclature)
2. Studyofworking offourstrokepetrolengine andfourstroke dieselengine withthehelp ofcutsection models.
3. Study of working of two stroke petrol and two stroke diesel engine with the help of cut sectionmodels.
4. Study of fuel supply system of a petrol engine (fuel pump and simplecarburettor)
5. Study of completecaurburettor
6. Study of Petrol InjectionSystem.
7. Study of fuel supply system of a Diesel engine (fuel pump and fuelinjector)
8. StudyofIgnitionsystemsofanICEngine (Batteryand Magneto ignitionsystemand Electronicignition system).
9. Study of Lubrication system of an IC Engine (Mist, Splash and Pressurelubrication)
10. Study of cooling systems of an IC Engine (Air cooling and watercooling)
11. To conduct a performance test on diesel engine to draw heat balance sheet for given load andspeed.
12. To determine friction power of diesel engine by Willan's line or fuel rate extrapolationmethod.
13. To conduct a performance test on the variable compression ratio engine and to draw the heat balancesheet for given compression ratio, speed and load and plot the performance curves.
14. To conduct a performance test on a four cylinder four stroke petrol engine and to draw the heat balancesheet and performancecurves.
15. Tocalculatetheindicatedpower,frictionpowerandmechanicalefficiencyoffour strokefour cylinderpetrol engine at full load and rated speed by Morsetest.
16. To draw the valve timing diagram of a four-stroke S.I. or C.I. Engine using experimentalsetup.
17. Analysis of engine exhaust gases using Orsat apparatus / gasanalyzer.

LIST OF EQUIPMENTS/MACHINES REQUIRED
1. Model of Two & Four Stroke PetrolEngine
2. Model of Two & Four Stroke DieselEngine
3. Single Cylinder Actual S.I.Engine in CutSection
4. Single Cylinder Actual C.I..Engine in CutSection
5. Four Stroke, Four-Cylinder Petrol Engine in CutSection
6. Carburettors in Cut Section / Without CutSection.
7. Model of Petrol InjectionSystem
8. Bosch Fuel Pump in CutSection
9. Nozzles in CutSection
10. Diesel Injectors in CutSection
11. Four Stroke Single-Cylinder Diesel Engine TestRig
12. Variable Compression Ratio Engine TestRig
13. Four Stroke Multi-Cylinder Petrol Engine TestRig
14. Experimental Setup for Drawing Valve Timing Diagram Of Four Stroke S.I. or C.I.Engines.
15. Orsat Apparatus / Gas Analyzer for Engine Exhaust GasAnalysis.

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch:AutomobileEngineering   **Semester:IV**
Subject: AutomotiveChassisLab   **Code: B037423(082)**
Total LabPeriods:24   **Batch Size:30**
MaximumMarks:40   **Minimum Marks:20**

List of Experiments: *(At least Ten experiments are to be performed by each student)*

1. Studyofhandtools,sketchinganditsuses,studyofdifferenttypesofchassislayouts,components.
2. Disassemblingcylinderhead,servicingofvalves,adjustingtappetclearance,testingvalvespringtensionwithspringtester
3. Disassembling of engine, inspection of components, servicing of components, de-carbonisingprocedure, measurement of dimensionofdifferentcomponentsofengine,comparewithstandardspecifications,pistonring testing,assemblingusing special tools.
4. Valve timing & adjustments off a belttension.
5. Compression test of petrol and dieselengine.
6. Rectifyingthetroublesinignitionsystem,adjustingsparkplugandCBPointgap,checkingignitiontiming.
7. Servicing of carburetor, carburetor adjustments, tuning ofcarburetors.
8. Servicing of A.C.Mechanical fuel pump and testing thepump.
9. Servicing of fuel injection pump, injector, testing ofinjector
10. Servicingofclutchassembly,checkingthespringtensionofcoilspringsinspringtester.
11. Dismantlingofgearbox,inspectingComponents,servicing,checkingthegearratios.
12. Dismantlingofdifferentialassembly,servicing,backlashadjustments,checkfordriveaxleratio.
13. Servicing of steering gear box, checking for endplay.
14. Servicingmasterandwheelcylindersinhydraulicbrakesystem,bleedingofbrakes.
15. Preparingimmaturemodelsofbodystructuresofcars,jeeps,vanandheavydutyvehicles.(By adoptingsuitablescalesprepared by sheetmetalwork)

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of the program: Bachelor of Engineering
Branch:AutomobileEngineering   **Semester:IV**
Subject:- Virtual Lab(Kinematics of Machine Lab)   **Code: B037424(082)**
Total LabPeriods:24   **Batch Size:30**
MaximumMarks:40   **Minimum Marks:20**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Position Analysis of Grashof Four Bar Chain Mechanism
2. Velocity Analysis of Grashof Four Bar Chain Mechanism
3. Acceleration Analysis of Grashof Four Bar Chain Mechanism
4. Position Analysis of NonGrashof Four Bar Chain Mechanism
5. Velocity Analysis of NonGrashof Four Bar Chain Mechanism
6. Acceleration Analysis of NonGrashof Four Bar Chain Mechanism
7. Position,Velocity and Acceleration Analysis of Slider Crank Mechanism
8. Position,Velocity and Acceleration Analysis of Scotch Yoke Mechanism
9. Position Analysis of Slider Crank Mechanism with Offset
10. Position Analysis of Elliptical Trammel
11. Study of Hart Straight Line Mechanism
12. Study of Peaucellier Straight Line Mechanism
13. Study of Elliptical Cam Mechanism

Chhattisgarh Swami Vivekanand Technical University,Bhilai

Name of program: **Bachelor of Technology**

Branch: **Common to All Branches**   Semester: **IV**

Subject: **Indian Culture and Constitution of India**   Code: B000406(046)

Total Theory Periods: **2/Week**   Total Tutorial Periods: **NIL**

Assignments: **Two (Minimum)**   Total Marks in ESE: **NIL**   Marks in TA: **10**

Objective: The Constitution is the supreme law and it helps to maintain **integrity** in the society and to promote unity among the citizens to build a great nation. The main objective of the Indian Constitution is to promote harmony throughout the nation.

Course Objectives

Upon completion of this course, the student shall be able

- To understand Meaning and concepts of Traditional and Modern of Culture
- To understand Sources of the Study of Indian Culture
- To Enable the student to understand the history and importance of constitution
- To understand philosophy of fundamental rights and duties
- To understand the powers and functions of executive, legislature and judiciary
- To understand the powers and functions of state government
- To understand the recent trends in Indian constitutional and election commission of India.

To understand the central and state relation, financial and administrative.

UNIT-I

Meaning and concepts of Culture: Traditional and Modern concepts of Culture-Notions of Culture in textual tradition, anthropological, archaeological and sociological understanding of the term culture. Elements of Culture, concept of Indianness and value system. Relation between culture and civilization. Historiography and approaches to the study of Indian Culture– Stereotypes, Objectivity and Bias, Imperialist, Nationalist, Marxist and Subaltern. Heritage of India and world's debt to Indian Culture.

UNIT–II

Sources of the Study of Indian Culture: Archaeological: cultural remains, Monuments, Numismatics, Epigraphy;

Literary sources and Oral traditions; Foreign Accounts; Archival sources.

UNIT–III

History of Indian Constitution Constitutional History, Preamble salient features, citizenship, Method of Amendment and Recent Amendments. **Rights and Duties** Fundamental Rights and Directive Principles of State Policy. Fundamental Duties. Difference between Fundamental Rights and Directive Principles of State Policy

Union Government a) President-powers and functions. Vice president powers and functions, Prime Minister and council of ministers powers and functions. b) Parliament- Loksabha, Rajyasabha- composition powers and functions.

c) Judiciary (Supreme Court) composition powers and functions Judicial Activism

UNIT–IV

State Government a) Governor: powers and functions b) Chief minister: powers and functions c) State Legislative Assembly and Legislative Council- composition powers and functions. d) High Court : composition powers and functions

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UNIT–V

Recent Trends in Indian Constitutional a) Basic structure of Indian Constitution. b) Electoral Reforms c) Panchayati Raj system in India.

Books of Reference

1. Dr. P. K. Agrawal Indian Culture, Art and Heritage,

2. P. Raghunadha Rao Indian Heritage and Culture

3. M.V.Pylee, An Introduction to the Constitution of India,NewDelhi,Vikas,2005.

4. Subhash C.Kashyap, Our Constitution: An Introduction to India's Constitution and constitutional Law, New Delhi, National Book Trust, 2000.

5. Durga Das Basu, Introduction to the Constitution of India ,NewDelhi,Prentice Hall of India,2001.

6. D.C.Gupta, Indian Government and Politics,VIII Edition,New Delhi, Vikas, 1994.

7. V.D.Mahajan, Constitutional Development and National Movement inIndia, New Delhi, S. Chand and Co., latest edition.