### Scheme of Teaching and Examination

#### B.E. IV Semester - Automobile Engineering

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Board of Study</th>
<th>Sub. Code</th>
<th>Subject</th>
<th>Periods Per Week</th>
<th>Scheme of Exam</th>
<th>Total Marks</th>
<th>Credit</th>
<th>ESE Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
<td>ESE</td>
<td>CT</td>
</tr>
<tr>
<td>1.</td>
<td>Mech. Engg</td>
<td>337451(37)</td>
<td>Fluid Mechanics</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Mech. Engg</td>
<td>382452(37)</td>
<td>Automotive Diesel Engines</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>3.</td>
<td>Mech. Engg</td>
<td>337453(37)</td>
<td>Applied Thermodynamics</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>4.</td>
<td>Mech. Engg</td>
<td>337454(37)</td>
<td>Kinematics of Machines</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>5.</td>
<td>Mech. Engg</td>
<td>382455(37)</td>
<td>Automotive Chassis</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>6.</td>
<td>Mech. Engg</td>
<td>337456(37)</td>
<td>Manufacturing Science-1</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>7.</td>
<td>Mech. Engg</td>
<td>382461(37)</td>
<td>Fluid Mechanics Lab</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>Mech. Engg</td>
<td>382462(37)</td>
<td>Automotive Petrol &amp; Diesel Engines Lab</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Mech. Engg</td>
<td>382463(37)</td>
<td>Manufacturing Technology Lab</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>Mech. Engg</td>
<td>382464(37)</td>
<td>Automotive Chassis Lab</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>Humanities</td>
<td>382465(46)</td>
<td>Health, Hygiene &amp; Yoga</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12.</td>
<td>Library</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>23</td>
<td>6</td>
<td>11</td>
<td>640</td>
</tr>
</tbody>
</table>

L – Lecturer, 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**.

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.
**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

**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-Newtonian fluids

**Fluid Statics:** Pressure, Pascal’s law, Hydrostatic law, Manometry, Hydrostatic force on submerged plane and curved surface, Buoyancy and Flotation.

**UNIT II**
**Fluid Kinematics:** Description of fluid motion, Lagrangian and Eulerian approach. Type of fluid flow, Type of flow line- pathline, 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, Pitot tube. Impulse momentum equation, Momentum of Momentum equation, Kinetic energy and Momentum correction factor, Vortex motion, Radial flow.

**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, Reynold’s model law, Euler’s model law, Weber’s model law, Mach’s model law, Type of models, scale effect in model, limitation of hydraulic similitude.

**Text Books:**

**Reference Books:**
1. Fluid Mechanics & Hydraulics Machines-R.K.Bansal-LaxmiPublications,.Delhi
2. Engineering Fluid Mechanics – K.L. Kumar, Eurasia Publication House, Delhi
5. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas-TMH, Delhi

**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 creativity in designing new systems components and processes in the field of engineering and mechanical engineering in particular.
- Identify, analyze, 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.
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

UNIT-II
FRONT AXLE AND STEERING SYSTEM

UNIT-III
DRIVE LINE, REAR AXLE, FINAL DRIVE, AND DIFFERENTIAL

UNIT-IV
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
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

REFERENCEBOOKS

Course Outcomes:
Acquire knowledge and hands-on competence in applying the concepts of auto chassis in the design and development of automobiles.
Demonstrate creativity in designing new systems, components, and processes in the field of Automobile Engineering.
Identify, analyze, and solve automobile engineering problems useful to the society.
Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Applied Thermodynamics
Total Theory Periods: 40
Class Tests: Two (Minimum)
ESE Duration: Three Hours

Semester: IV
Code: 337453(37)
Total Tutorial Periods: 10
Assignments: Two (Minimum)

Maximum Marks: 80
Minimum Marks: 28

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 overview 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, Ericson, Atkinson and Lenoir cycle

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:

ReferenceBooks:
1. Fundamental of engineering thermodynamics-R.Yadav ,CPH, Allahabad
3. Fundamental of Thermodynamic- Claus Borgnakke, Richard E. Sonntag, Wiley,Delhi
4. An Introduction to Thermodynamics-Y.V.C.Rao ,UniversityPrass, Hyderabad
6. Thermodynamics –C.P. Arora – TMH , 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.
Name of the program: Bachelor of Engineering  
Branch: Automobile Engineering  
Subject: Kinematics of Machines  
Total Theory Periods: 40  
Class Tests: Two (Minimum)  
ESE Duration: Three Hours  
Maximum Marks: 80  
Code:337454(37)  
Total Tutorial Periods: 10  
Assignments: Two (Minimum)  
Minimum Marks: 28  

<table>
<thead>
<tr>
<th>Course Objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>To synthesize, both graphically and analytically, multilink mechanisms.</td>
</tr>
<tr>
<td>To perform mechanism analyses to find the position, velocity, acceleration, and dynamics of multi-bar mechanisms.</td>
</tr>
<tr>
<td>To synthesize mechanism to perform certain prescribed task/motion</td>
</tr>
<tr>
<td>To analyze gear trains.</td>
</tr>
<tr>
<td>To analyze thrust bearings, Brakes and dynamometers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIT II</td>
<td>Relative Acceleration: Synthesis of mechanism, Pantograph, Lower pair mechanism, Relative acceleration diagram, Kliens construction, Coroillis component of acceleration.</td>
</tr>
<tr>
<td>UNIT IV</td>
<td>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.</td>
</tr>
</tbody>
</table>
| UNIT V | (a)Friction: Applications of friction, Pivot and collar friction, Thrust bearing.  
(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, Transmission dynamometer. |

<table>
<thead>
<tr>
<th>TextBooks:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ReferenceBooks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Theory of Machine– Shigley,JE</td>
</tr>
<tr>
<td>3. Theory of Machine-Jagdish Lal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply knowledge of Kinematics of machine for understanding, formulating and solving engineering problems.</td>
</tr>
<tr>
<td>Acquire knowledge and hands-on competence in applying the concepts kinematics of machine in the design and development of mechanical systems.</td>
</tr>
<tr>
<td>Demonstrate creativeness in designing new systems components and processes in the field of engineering.</td>
</tr>
<tr>
<td>Identify, analysis, and solve mechanical engineering problems useful to the society.</td>
</tr>
<tr>
<td>Work effectively with engineering and science teams as well as with multidisciplinary designs.</td>
</tr>
</tbody>
</table>
Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Automotive Diesel Engines
Total Theory Periods: 40
Class Tests: Two (Minimum)
ESE Duration: Three Hours

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

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 type combustion chamber. Introduction-Inlet Manifold, Construction with reference to Efficiency.

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

TEXTBOOKS
2. Internal Combustion Engine–V.Ganeshan–TMH

REFERENCESBOOKS
   IBH Publishing Company

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
Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Manufacturing science-I

Total Theory Periods: 40
Total Tutorial Periods: 10
Class Tests: Two (Minimum)
Assignments: Two (Minimum)
ESE Duration: Three Hours

Maximum Marks: 80
Minimum Marks: 28

UNIT-I


UNIT-II

UNIT-III

UNIT-IV

UNIT-V

Text Books:

Reference Books:

COURSEOBJECTIVES
- To understand various manufacturing processes & its classifications
- To understand various Casting processes
- To understand various welding processes
- To understand various metal removal process
- To appreciate the capabilities, advantages and the limitations of the processes


UNIT-II

UNIT-III

UNIT-IV

UNIT-V

Text Books:

Reference Books:

COURSEOUTCOMES:
- Acquire knowledge and hands-on competence in applying the concepts of manufacturing science in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- 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.
Name of the program: Bachelor of Engineering  
Branch: Automobile Engineering  
Subject: Fluid Mechanics Lab  
Total Lab Periods: 24  
Maximum Marks: 40  

Semester: IV  
Code: 382461(37)  
Batch Size: 30  
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 ship model.
2. To verify Bernoulli’s Theorem.
3. To verify Impulse Momentum Principle.
4. To calibrate a Venturi meter and study the variation of co-efficient of discharge.
5. To calibrate an orifice-meter.
6. Experimental determination of critical velocity in pipe.
7. To determine of head loss in various pipe fittings.
9. To study the transition from laminar to turbulent flow and to determine the lower critical Reynold’s number.
10. To determine the hydraulic coefficients (Cc, Cd and Cv) of an orifice.
11. To determine the coefficient of discharge of a mouth-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 velocity profile.
14. To study the variation of friction factor for pipe flow.
15. To determine the roughness co-efficient of an open channel.

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 Cc, Cd & Cv
- 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
List of Experiments: (At least Ten experiments are to be performed by each student)

1. Study of hand tools, sketching and its uses, study of different types of chassis layouts, components.
2. Disassembling cylinder head, servicing of valves, adjusting tappet clearance, testing valve spring tension with spring tester.
3. Disassembling of engine, inspection of components, servicing of components, de-carbonising procedure, measurement of dimension of different components of engine, compare with standard specifications, piston ring testing, assembling using special tools.
4. Valve timing & adjustments off a belt tension.
5. Compression test of petrol and diesel engine.
6. Rectifying the troubles in ignition system, adjusting spark plug and CB Point gap, checking ignition timing.
7. Servicing of carburetor, carburetor adjustments, tuning of carburetors.
8. Servicing of A.C. Mechanical fuel pump and testing the pump.
9. Servicing of fuel injection pump, injector, testing of injector.
10. Servicing of clutch assembly, checking the spring tension of coil springs in spring tester.
11. Dismantling of gear box, inspecting Components, servicing, checking the gear ratios.
13. Servicing of steering gear box, checking for end play.
14. Servicing master and wheel cylinders in hydraulic brake system, bleeding of brakes.
15. Preparing immature models of body structures of cars, jeeps, van and heavy duty vehicles. (By adopting suitable scales prepared by sheet metalwork)
EXPERIMENTS TO BE PERFORMED (MINIMUM TEN EXPERIMENTS)

**Shaper Machine**
1. Study of Quick Return Mechanism and Table feed mechanism.
2. V groove in C.I. Block.

**Milling Machine**
3. Study of indexing mechanism (simple and differential)
4. Study of different milling cutters and operations.(End cutter, Face cutter & T-Slot cutter)
5. Gear Cutting

**Lathe**
7. Facing, straight turning, step turning & taper turning.
8. Thread cutting and knurling.
9. Boring

**Welding**
11. Joining of metals by Arc welding
12. Joining of metals by Spot welding (Metallic sheets)
13. Joining of metals by Soldering & Brazing (Metallic wires)
14. Joining of metals using MIG welding (Metallic plates)

**Molding**
15. Preparation of solid & split pattern.
16. Preparation of non-ferrous casting using solid and split pattern.

**Advanced Fitting**
17. Drilling, Filing tapping and assembly of casting produced on a base plate.

LIST OF EQUIPMENTS/MACHINES REQUIRED
1. Center Lathe
2. Wood Working Lathe
3. Capstan & Turret Lathe
4. Shaper Machines
5. Milling Machines
6. MIG Welding Machines
7. Spot Welding Machine
8. Drilling Machine
10. Carpentry Tools
11. Fitting Tools
12. Molding Tools
13. Measurement Tools
14. Equipments for costing of nonferrous material.
15. Slotter and Planner Machines
Name of the program: Bachelor of Engineering  
Branch: Automobile Engineering  
Subject: Automotive Petrol & Diesel Engines Lab  
Total Lab Periods: 24  
Maximum Marks: 40

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 engine nomenclature)  
2. Study of working of four stroke petrol engine and four stroke diesel engine with the help of cut section models.  
3. Study of working of two stroke petrol and two stroke diesel engine with the help of cut section models.  
4. Study of fuel supply system of a petrol engine (fuel pump and simple carburettor)  
5. Study of complete carburettor  
7. Study of fuel supply system of a Diesel engine (fuel pump and fuel injector)  
8. Study of Ignition systems of an IC Engine (Battery and Magneto ignition system and Electronic ignition system).  
9. Study of Lubrication system of an IC Engine (Mist, Splash and Pressure lubrication)  
10. Study of cooling systems of an IC Engine (Air cooling and water cooling)  
11. To conduct a performance test on diesel engine to draw heat balance sheet for given load and speed.  
12. To determine friction power of diesel engine by Willan’s line or fuel rate extrapolation method.  
13. To conduct a performance test on the variable compression ratio engine and to draw the heat balance sheet 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 balance sheet and performance curves.  
15. To calculate the indicated power, friction power and mechanical efficiency of four stroke four cylinder petrol engine at full load and rated speed by Morse test.  
16. To draw the valve timing diagram of a four-stroke S.I. or C.I. Engine using experimental setup.  

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Model of Two & Four Stroke Petrol Engine  
2. Model of Two & Four Stroke Diesel Engine  
3. Single Cylinder Actual S.I. Engine in Cut Section  
4. Single Cylinder Actual C.I. Engine in Cut Section  
5. Four Stroke, Four-Cylinder Petrol Engine in Cut Section  
6. Carburettors in Cut Section / Without Cut Section.  
7. Model of Petrol Injection System  
8. Bosch Fuel Pump in Cut Section  
9. Nozzles in Cut Section  
10. Diesel Injectors in Cut Section  
11. Four Stroke Single-Cylinder Diesel Engine Test Rig  
12. Variable Compression Ratio Engine Test Rig  
13. Four Stroke Multi-Cylinder Petrol Engine Test Rig  
15. Orsat Apparatus / Gas Analyzer for Engine Exhaust Gas Analysis.
Name of the program: Bachelor of Engineering  
Branch: Automobile Engineering  
Subject: Health, Hygiene & Yoga  
No Periods: 2 per week  
Maximum Marks: 40  

Semester: IV  
Code: 382465(46)  
Total Tutorial periods: Nil  
Minimum Marks: 24

Course Objectives
To provide understanding the importance of health.  
To provide in sight in to the hygiene aspect & quality of life.  
To study the concepts of various medica therapy.  
To practice the various yogasans.  
To provide knowledge about common diseases and its cure through yogasans and pranayam.  
To develop concentration through various methods.

UNIT- I  
HEALTH & HYGIENE: Concept of health, Physical health and mental 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 underrating, 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  
INTRODUCTORY KNOWLEDGE OF COMMON STREAMS OF MEDICINAL CURE: History, development, basic concepts, modes of operation of Alopathy, Ayurved, Homoeopathy, Biochemic, Unani, Siddha, Accupressure, Accupuncture, 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, Matsyasen, Matyendrasan, Pawanmuktasan, Vajrasan, Shalabhasan, Sinhasan, Shashankasan, Surya Namaskar, Halasan, Janushiras, 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 stomach disorders, such as, indigestion, acidity, dyentry, 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.

Text Books:
Health, Hygiene & Yoga, Dr P B Deshmukh, Gyan Book Pvt Ltd. New Delhi.

Reference Books:
(1) Yogic Materia Medica
(2) Asan, Pranayam and Bandh.