

SCHEME OF EXAMINATION

And

SYLLABI

For

BACHELOR OF VOCATION

In

(AUTOMOBILE)

3rd SEMESTER & 4th SEMESTER

Offered by

University School of Engineering and Technology



**Guru Gobind Singh Indraprastha University
Dwarka, Delhi – 110078 [INDIA]**

www.ipu.ac.in

NOMENCLATURE OF CODES GIVEN IN THE SCHEME OF B.VOC

1. **ET** stands for Engineering and Technology.
2. **V** stands for Vocation.
3. **MC** stands for Mobile Communication.
4. **SD** stands for Software Development.
5. **AE** stands for Automobile.
6. **CE** stands for Consumer Electronics.
7. **PT** stands for Printing Technology.
8. **CT** stands for Construction Technology.
9. **RA** stands for Refrigeration & Air-Conditioning.
10. **PD** stands for Power Distribution Management.
11. **ID** stands for Interior Design.
12. **AA** stands for Applied Arts.
13. **CS** stands for Computer Science.
14. **MS** stands for Management Studies.
15. **EN** stands for Environmental Engineering
16. **AS** stands for Applied Science.
17. **HS** stands for Humanities and Social Sciences.
18. **SS** stands for Social Services.
19. **L/T** stands for Lecture and Tutorial
20. **P** stands for Practicals.
21. **S/D** stands for Drawing/Studio
22. **P/D** stands for Practical/Drawing



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

**BACHELOR OF VOCATION
(AUTOMOBILE)
THIRD SEMESTER EXAMINATION
(LEVEL-VI)**

Paper Code	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETVAE-601		Thermal Engineering	3	0	3
ETVAE-603		Chassis Body & Transmission	3	0	3
ETVAE-605		Instruments and Equipment	3	0	3
ETVAE-607		Automotive Components Design	3	0	3
ETVAE-609		Energy Sources for Automobiles	3	0	3
OPEN ELECTIVE-III (Select any one)					
ETVAE-611		Theory of Machines	3	0	3
ETVAE-613		Industrial Pollution Prevention and Control	3	0	3
ETVMS-617		Industrial Management	3	0	3
PRACTICAL/VIVA VOCE					
ETVAE-651		Thermal Engineering Lab	0	4	4
ETVAE-653		Chassis Body & Transmission Lab	0	4	4
ETVAE-655		Instruments and Equipment Lab	0	3	3
ETVAE-657		Industrial Training-II	0	2	4
TOTAL			18	13	33

NOTE:

There are five industrial trainings to be carried out by the student(s) in B.Voc course. Industrial Trainings I, III and V will be with weightage of two credits each. These trainings are to be carried out during winter vacations for the duration of two weeks. Industrial Trainings II and IV will be with weightage of four credits each. These trainings are to be carried out during summer vacations for the duration of four to six weeks. These training may be done from industry/Skill Knowledge Providers (SKPs) /Sector Skill Councils (SSCs) / Training Centers/Institutes. Student should submit training report during evaluation. Industrial Training done at the end of the semester will be evaluated in the subsequent semesters.

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

**BACHELOR OF VOCATION
(AUTOMOBILE)
FOURTH SEMESTER EXAMINATION
(LEVEL-VI)**

Paper Code	Paper ID	Paper	L	T/P	Credits
THEORY PAPERS					
ETVAE-602		Internal Combustion Engines	3	0	3
ETVAE-604		Alternative Fuels & Pollution Control	3	0	3
ETVAE-606		Tractors, Farm Equipment and Off Road Vehicles	3	0	3
CORE ELECTIVE-I (Select any one)					
ETVAE-608		Vehicle Transport Management	3	0	3
ETVAE-610		Tyre Technology	3	0	3
OPEN ELECTIVE-IV (Select any one)					
ETVCT-614		Global Warming & Climate Change	3	0	3
ETVMS-616		Entrepreneurship Development and Planning	3	0	3
PRACTICAL/VIVA VOCE (Select any one Lab based on theory)					
ETVAE-658		Vehicle Transport Management Lab	0	3	3
ETVAE-660		Tyre Technology Lab	0	3	3
PRACTICAL/VIVA VOCE					
ETVAE-652		Internal Combustion Engines Lab	0	4	4
ETVAE-654		Alternative Fuels & Pollution Control Lab	0	3	3
ETVAE-656		Industrial Training-III	0	0	2
ETVAE-662		Project-II	0	6	3
TOTAL			15	16	30

NOTE:

There are five industrial trainings to be carried out by the student(s) in B.Voc course. Industrial Trainings I, III and V will be with weightage of two credits each. These trainings are to be carried out during winter vacations for the duration of two weeks. Industrial Trainings II and IV will be with weightage of four credits each. These trainings are to be carried out during summer vacations for the duration of four to six weeks. These training may be done from industry/Skill Knowledge Providers (SKPs) /Sector Skill Councils (SSCs) / Training Centers/Institutes. Student should submit training report during evaluation. Industrial Training done at the end of the semester will be evaluated in the subsequent semesters.

NOTE FOR PROJECT:

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports.

THERMAL ENGINEERING

Paper Code: ETVAE-601
Paper: Thermal Engineering

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: Student should have studied subjects such as General Science, Physics, Mathematics and have the basic knowledge about automobile to have an enhanced exposure. This subject provides knowledge about the basics of thermal engineering.

Learning Outcomes: This knowledge will be helpful to the student in co-relating various principles and their applications understanding in a better manner.

UNIT-I

Thermodynamics: Introduction to Thermodynamics, Concepts of systems, control volume, state, properties, equilibrium, quasi-static process, reversible & irreversible process, cyclic process. Zeroth, Ist and IInd Law and their applications, concept of heat engine and heat pump

[T1, T3][No. of Hrs. 11]

UNIT-II

Gas Power Cycles: Thermodynamic and mechanical cycles, Carnot cycle, air standard cycles- Otto, Diesel. Deviation of actual IC engine cycles from air standard cycles.

[T1, T2][No. of Hrs. 11]

UNIT-III

Air Compressors and Turbines: applications of compressed air, classification of compressor- reciprocating-rotary, single stage- multi stage. Super charger
Principles of turbine operation, types of turbine- gas turbine, applications of turbine.

[T1,T2][No. of Hrs.11]

UNIT-IV

Internal Combustion Engine: definition, types, fundamentals and operation, components, function and constructional details. Fuels and lubricants for IC engines, characteristics thereof, introduction to air conditioning system, refrigeration cycle- components and working.

[T1,T2][No. of Hrs.12]

Text Book(s):

- [T1] Basic and applied Thermodynamics, P.K. Nag, Mc Graw Hill Publication.Co, 602
 [T2] Thermal Engineering, K K Ramalingam, Scitech Publication

Reference Book(s):

- [R1] An Introduction to Thermodynamics, Y.V.C.Rao, Wiley Eastern, 1993,
 [R2] Fundamental of Classical Thermodynamics, G.J. Van Wylen and R.E. Sontang Wiley Eastern Publication
 [R3] Engineering Thermodynamics, J.B.Jones and G.A.Hawkins, John Wiley and Sons.

CHASSIS BODY & TRANSMISSION**Paper Code: ETVAE-603****Paper: Chassis Body & Transmission**

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: To familiarize the students with the fundamentals of Automobile Chassis. Students should have studied subjects such as elements of automobile engineering, Physics, chemistry etc.

Learning Outcomes: Students will be able to know the basics of Automobile Chassis Components, Construction and Working principle of Front Axle, Rear Axle, Wheels, Tyres, Steering System, Brakes and Suspension System.

UNIT-I

Introduction: Types of chassis layout with reference to power plant location and drive. Vehicle frames- Types of frames – Two, Three, four wheelers & HV, general form & dimensions, materials, frame stresses, frame sections, cross members, proportions of channel sections, constructional details, loading points, sub frames, passenger car frames, X member type frame, Box section type frame, testing of frames, bending and torsion test, effect of brake application of frame stresses, truck frames, defects.

[T1, T2][No. of Hrs. 11]**UNIT-II**

Steering, suspension, brake system: requirements, front axle details & geometry, construction & working details of rack and pinion type steering, worm & nut with recirculating balls type steering. Concept and working of power steering (hydraulic & electronic). Suspension systems requirements, independent and dependent suspension, front & rear suspension systems of the vehicle. Different type of brake system, conventional drum type brakes, disc brakes, self energizing brakes & ABS, characteristics of brake fluid. Tyre selection, cross ply, radial tyres, tubeless tyres, their construction details, comparison & application, hotch-kiss drive, torque-tube drive and radius rods. Propeller shaft, universal joints. Front wheel drive, Constant velocity joints. Differential principle. Construction details of differential unit.

[T1, T2][No. of Hrs. 12]**UNIT-III**

Body Details: Standard design of a car body, general requirements of a car body, body materials, body surface-corrosion protection, body finishing components- bumpers, exterior strips, impact strips, glazing, door latches etc. Safety- active, passive Classification of bus bodies – Based on distance traveled, capacity of the bus and style & shape. Construction of conventional and integral type buses & comparison.

[T1, T2][No. of Hrs. 11]**UNIT-IV**

Transmission: Various resistances to motion of the automobile, traction, tractive effort performance curves, acceleration gradeability, drawbar pull, Necessity of clutch in an automobile, different types of clutches, clutch - adjustment, clutch troubles and their causes, requirements of a clutch, clutch materials, clutch lining, Introduction to torque converters, the need for transmissions, necessity of gear box, calculation of gear ratios for vehicles, performance characteristics in different gears, desirable ratios of 3speed & 4speed gear boxes, construction details of, sliding-mesh gear box, constant-mesh gear box, synchromesh gear box, auxiliary transmissions, compound transmissions. Automatic transmission - principle, general description, types.

[T1, T3][No. of Hrs. 11]**Text Book(s):**

- [T1] Automotive Chassis – P.M. Heldt, Chilton & Co.
 [T2] Automotive chassis and body – P.L. Kohli, Mc Graw Hill Publication.Co,
 [T2] Fundamentals of Automatic Transmission by William Hasselbee.

Reference Book(s):

- [R1] Automotive Chassis: Engineering Principles- Jornsens Reimpell, Helmut Stoll, Elsevier, 601.
 [R2] Motor Vehicles Newton- Steeds & Garrot, SAE International and Butterworth Heinemann, 601
 [R3] Steering Suspension and Tyres- Giles.J.G, Iliffe Book Co. London, 1988.
 [R4] Automotive Chassis-Brakes, Steering and Suspension- Tim Gilles, Thomson Delmer Learning, 605.

Scheme and Syllabi for B. Voc. (Automobile)(2nd year) w. e. f. batch 2016-17, approved in the BOS of USET/USICT held on 19th July, 2016 & AC Sub Committee Meeting of USET/USICT held on 27th July, 2016.

INSTRUMENTS AND EQUIPMENT

Paper Code: ETVAE-605
Paper: Instruments and Equipment

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: Student should have studied subjects such as elements of automobile engineering, and automobile service & maintenance. This subject provides knowledge about specification and use of different instruments and garage equipment used in automobile garages and service stations for different operations.

Learning Outcomes: The students after studying this subject will be able to identify, use and repair different automobile garage equipment.

UNIT-I

Metrology and Instrumentation: Metrology- definition, objectives, and necessity. Precision Measurement, limits fits and tolerances, measuring instruments- classification, linear measurement- vernier caliper, micrometer, dial gauge. Angular measurement- combination set, plain surface measurement- level surface gauge, surface plate.

Instrumentation- modes of measurement- primary or direct, secondary or indirect involving one translation, territory- indirect measurement involving two conversions

[T1] [T2] [No. of Hrs. 11]

UNIT II

Servicing Equipment: Garage, service station, tune-up, specification and application of - air compressor, hydraulic hoist, electro mechanical hoist, jack (mechanical, hydraulic), car washer and automatic car washer, grease dispenser, oil sprayer, tyre changer, wheel balance, wheel aligner, use of vacuum gauge, compression gauge, cam (dwell) angle and r.p.m. tester, battery Tester, spark plug cleaner and tester, ignition timing light, fuel injector tester, fuel consumption tester, cylinder leakage tester, radiator tester, exhaust gas analyzer, smoke meter, on- board/ smart diagnostic tool

[T1] [T2] [No. of Hrs. 12]

UNIT-III

Engine repair, measuring, testing and reconditioning equipment: Specification and use of- torque wrench, pneumatic wrench, piston ring compressor and expander, piston ring filer, groove cleaner, scrapers, Valve lifter and valve spring tester, inside & outside micrometer, dial micrometer, cylinder bore gauge, cylinder boring machine and honing machine, crankshaft and camshaft grinding machine, connecting rod aligner, line boring machine, valve refacing, valve seat cutting and grinding machine, cylinder head refacing machine

[T1] [T2] [No. of Hrs. 11]

UNIT-IV

Electrical repair instruments: Specification and use of- soldering iron, digital multimeter, growler, battery charger, head light beam aligner, alternator voltage regulator tester, test bench for starter motor and alternator

[T1] [T2] [No. of Hrs. 11]

Text Book(s):

- [T1] Garage Equipment-- R K Chauhan, Ishan Publications.
 [T2] Engineering metrology and instrumentation, R K Rajput, S K Kataria and Sons Publication

Reference Book(s):

- [R1] Tune-up testing and performance – Ken Layne, Regents/Prentice Hall, 1993
 [R2] Classroom Manual for Automotive Engine Performance- Douglas Vidler, Thomson/Delmar Learning, 603
 [R3] Today's Technician: Automotive Computer Systems- Donald Knowles, Jack Erjavec, Cengage Learning, 1996

AUTOMOTIVE COMPONENTS DESIGN**Paper Code: ETVAE-607****Paper: Automotive Components Design**

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: Student should have studied subjects such as elements of automobile engineering, engineering materials & mechanics of solids and basic of electrical & electronics engineering. This subject provides knowledge of basic principles of design and drawing of different components and systems of automobiles.

Learning Outcomes: After studying this subject, the student shall be able to explain aesthetic and ergonomics to design machine component, design different components for specific requirements and trace the electrical circuits for specific requirements.

UNIT-I

Introduction to Engineering Design: Design methods, Aesthetic and Ergonomics consideration in design, Material properties and their uses in design, Manufacturing consideration in design, Design considerations of casting and forging, Basic principles of Machine Design, Modes of failures, Factor of safety, Design stresses, Principal stresses and strains, Theories of failures, Standards, I. S. codes, Preferred Series and Numbers.

[T1, T2, T3][No. of Hrs. 12]**Design and Drawing of Components:****UNIT-II****Piston, piston rings, piston pin**

Piston Temperatures, piston slap, compensation of thermal expansion in pistons. Piston Rings, forms of gap, stresses in piston rings, ring collapse, heat treatment, piston ring selection, shape. Piston pin, locking of piston pins, length of piston.

[T1, T2, T3][No. of Hrs.11]**UNIT-III**

Connecting rod: Length of rod, Cross section, Buckling, Drilled connecting rods, piston pin bearing, offset connecting rods, effects of whipping, bearing materials, lubrication.

[T1][No. of Hrs.11]**UNIT-IV**

Crank Case, Crank shaft : Crank Case – General form of crank case, oil sumps and cooling features, flywheel mountings Crank shaft- Balance weights, local balance, Crankshaft proportions, oil holes drilled in crank shafts, balancing, vibration dampers, firing order, bearings, lubrication.

[T1][No. of Hrs. 11]**Text Book(s):**

- [T1] Automobile Design and Drawing - R.B.Gupta, Satya Prakashan
- [T2] Design of Machine Elements- V. B. Bhandari, McGraw Hill Publication
- [T3] Machine Design- Pandya & Shah, Charotar Publishing.

Reference Book(s):

- [R1] Mechanical Engineering Design- J. E. Shigley, McGraw Hill Publication
- [R2] Design of machine elements- Sharma & Purohit, Prentice Hall India Pub.
- [R3] Machine Design-An Integrated Approach- Robert L. Norton, Pearson Education.
- [R4] Fundamentals of Machine Elements- Hawrock & Jacobson, McGraw Hill Publication

ENERGY SOURCES FOR AUTOMOBILES**Paper Code: ETVAE-609****Paper : Energy Sources for Automobiles**

L	T	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: Student should have studied subjects such as Physics, General Science and Elements of automobile engineering. This subject provides knowledge of different energy sources used in internal combustion engines. The objective of this subject is to make the student understand the phenomenon of combustion with fossil fuels, air requirement and different engine performance parameters.

Learning Outcomes: The student after studying this subject should be able to plan the transportation and should be able to design the roads or pathways accordingly.

UNIT-I

Energy Sources:

Different forms of energy, classification of energy resources- commercial- non commercial, renewable- non renewable, conventional- non conventional, availability of conventional energy resources, classification of non conventional energy resources.

[T1] [T2] [No. of Hrs.11]**UNIT II**

Hydrocarbon Fuels: Origin of petroleum, its chemistry, refining of petroleum: fractional distillation, cracking, reforming process. - only a brief introduction.

Properties and tests: Specific Gravity, viscosity, flash and fire points, calorific value, rating of fuels- cetane, octane number, cloud and pour point.

Properties and rating of fuels, lead free gasoline's, low and ultra – low sulphur diesels, LPG, CNG, Alcohols, Gaseous Fuel Injections, Dual Fueling and Controls – CNG and Gasoline, Hydrogen and Diesel, Alcohols and Diesels etc.

determination of theoretical minimum quantity of air for complete combustion. Determination of air fuel ratio for a given fuel.

[T1] [T2] [No. of Hrs. 12]**UNIT-III**

Bio fuels: need and necessity, types, advantages. Process of using – blending of biofuels with hydrocarbon fuels. Fuel properties of biogas, fuel properties of biomass. Fuel cells

[T1] [T2] [No. of Hrs. 11]**UNIT-IV**

Electrical Energy Source: types of SPV Cells, P-V, V-I characteristics of SPV cells, applications, features and limitations of SPV cells. Cell batteries for electrical energy, types of batteries, traction batteries- lead acid, lithium ion, Process of utilizing battery for automobiles propulsion, hybrid cars

[T1] [T2] [No. of Hrs. 11]**Text Book(s):**

- [T1] A Course in I.C. Engine - Mathur & Sharma , Dhanpat Rai & Sons, Delhi, 1994
 [T2] Internal Combustion Engines-V Ganesan, Tata McGraw Hill, Delhi, 602
 [T3] Non conventional energy sources and Utilisation- R K Rajput , S Chand publication

Reference Book(s):

- [R1] Fundamentals of I.C.Engines - J.B.Heywood, McGraw Hill International Edition
 [R2] I.C. Engine - Maleev & Litchy, McGraw Hill
 [R3] Modern Petrol Engine - A.W.Judge, B.I. Publications. 1983
 [R4] Automobile Engineering Vol. II - Kirpal Singh, Standard publications, New Delhi, 605

INDUSTRIAL MANAGEMENT
(Open Elective-III)

Paper Code: ETVMS-617
Paper: Industrial Management

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The course provides a broad introduction to some aspects of business management and running of business organization.

UNIT-I

Industrial relations- Definition and main aspects. Industrial disputes and strikes. Collective bargaining.

Labour Legislation- Labour management cooperation/worker's participation in management. Factory legislation. International Labour Organization.

[T1, T2][No. of Hrs. 11]

UNIT-II

Trade Unionism- Definition, Origin, Objectives of Trade Unions. Methods of Trade unions. Size and finance of Indian Trade unions-size, frequency distribution, factors responsible for the small size. Finance-sources of income, ways of improving finance.

[T1, T2][No. of Hrs. 11]

UNIT-III

Work Study-Method study and time study. Foundations of work study. Main components of method study. Time study standards. Involvement of worker's unions. Work Sampling. Application of work study to office work.

[T1, T2][No. of Hrs. 11]

UNIT-IV

Quality Management- What is Quality? Control Charts. Quality is everybody's job. Taguchi Philosophy. Service Quality. What is Total Quality Management (TQM)? Roadmap for TQM. Criticism of TQM. Six Sigma.

[T1, T2][No. of Hrs. 12]

Text Book(s):

- [T1] Sinha, P.R.N., Sinha I.B. and Shekhar S.M.(2013), Industrial Relations, Trade Unions and Labour Legislation. Pearson Education
- [T2] Chary, S.N. (2012), Production and Operations Management. Tata McGraw Hill Education.

Reference Book(s):

- [R1] Srivastava, S.C. (2012), Industrial Relations and Labour Laws, Vikas Publishing
- [R2] Shankar R (2012), Industrial Engineering and Management. Galgotia Publications
- [R3] Telsang, M. (2006), Industrial Engineering and Production Management. S.Chand
- [R4] Thukaram, Rao (2004), M.E. Industrial Management. Himalaya Publishing House.

THEORY OF MACHINES
(Open Elective-III)

Paper Code: ETVAE-611
Paper: Theory of Machines

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives and Pre-requisites:** Students should have studied subjects such as Physics, mechanics of solid, basic of automobile engineering etc. After studying this subject the student shall be able to analyze different machines.*

***Learning Outcomes:** The knowledge of this subject will give the student n understanding to analyze different mechanism of automobile in their professional life and industry.*

UNIT-I

Gears & Gear Trains: Introduction, law of gearing, types of gear tooth profile- involute & cycloidal, Interference in involute tooth gears and methods for its prevention, contact ratio, path of contact, arc of contact, Efficiency and center distance of spiral gears. Types of Gear trains Simple, Compound, Epicyclic, Reverted gear train, Tabular method for finding the speeds of elements in epicyclic gear train, Differential gear box.(no numerical treatment)

[T1] [T2][No. of Hrs. 11]

UNIT-II

Kinetic Analysis of Mechanisms: Inertia force and torque, D'Alembert's principle, dynamically equivalent system, force analysis of reciprocating engine mechanism.

[T1] [T2][No. of Hrs. 11]

UNIT III

Balancing: Static and dynamic balancing of rotary and reciprocating masses, primary and secondary forces and couples, direct and reverse cranks. balancing of single cylinder, multi cylinder- in-line and V-engines.

[T1] [T2][No. of Hrs. 11]

UNIT-IV

Vibrations: Basic concepts and definitions, vibration measuring instruments, free and forced vibrations. Types of damping, Equivalent Springs, Free vibrations with and without damping (Rectilinear, Torsional & Transverse), over, under & critical damping, damping factor, logarithmic decrement, equivalent viscous damping, Coulomb damping. Forced vibrations with viscous damping, magnification factor, frequency response curves, vibration isolation and transmissibility, Whirling of Shafts and Critical speeds

[T1] [T2][No. of Hrs. 12]

Text Book(s):

- [T1] Theory of Machines- Rattan S.S., McGraw Hill Pub. Co. Ltd., New Delhi, Fourth Edition
[T2] Mechanism and Machine Theory- Rao J.S. , Dukkipati R. V., Wiley Eastern Ltd.

Reference Book(s):

- [R1] Mechanical Vibrations, Grover G. K., New Chand & Bros., Roorkee.
[R2] Theory of Machines, Thomas Bevan, C.B.S. Publishers & Distributors.
[R3] Theory of Machines & Mechanisms, Shigley J.E., Oxford University Press, III Edition
[R4] Theory of Machines, Jagdishlal, Metropolitan Book Co. Pvt. Ltd., New Delhi

INDUSTRIAL POLLUTION PREVENTION AND CONTROL
(Open Elective-III)

Paper Code: ETVAE-613

Paper: Industrial Pollution Prevention and Control

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives and Pre-requisites:** Students should have studied subjects such as General Science, social studies and environmental studies. The main objective of this subject is to make aware the students about different types of industrial pollutants and their control.*

***Learning Outcomes:** After learning this subject the students will able to apply pollution control measures in their respective workplace.*

UNIT-I

Introduction: Relation between man and environment, different type of pollutants, different aspects of pollution control, harmful effects of different pollutants.

[T1,T2][No. of Hrs. 11]

UNIT-II

Industrial pollution emission and Indian standards: Industrial emissions- liquid emissions, gaseous emissions, Water quality management in India, Air (Prevention & Control of pollution) Act- 1981

[T1,T2][No. of Hrs. 11]

UNIT-III

Pollution control for selected pollutants: Removal of particulate matter, removal of sulphur di-oxide, removal of oxides of nitrogen, removal of organic vapours from effluent gases.

[T1,T2][No. of Hrs. 11]

UNIT-IV

Pollution control in selected industries: Pollution control aspects of fertilizer industry, petroleum refineries, control of radioactive wastes.

[T1,T2][No. of Hrs. 12]

Text Book(s):

[T1] Pollution control in process industries- S P Mahajan, Tata McGraw hill publication

[T2] Textbook of Environmental Engineering- P Venugopala Rao, Eco. Edition, PHI, New Delhi

Reference Book(s):

[R1] Textbook of Environmental Engineering- P Venugopala Rao, Eco. Edition, PHI, New Delhi

[R2] Hazardous and Industrial wastes- Arup K Sengupta, Technomic Publishing Co. Inc.

THERMAL ENGINEERING LAB**Paper Code: ETVAE-651**

L	T/P	C
0	4	4

Paper: Thermal Engineering Lab

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. Determination of Flash and Fire Points of fuels.
2. Determination of calorific values of solid, liquid and gaseous fuels
3. Determination of viscosity of oils/ fuels using viscometer.
4. Determination of cloud and pour points of light, medium and heavy oils.
5. Determination of compression ratio for a given engine.
6. Drawing of Valve/ port timing diagram for a given engine.
7. Study of air compressors.
8. Study of gas turbine.
9. Study of I C engine
10. Study of components of air conditioning system.



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

CHASSIS BODY & TRANSMISSION LAB**Paper Code: ETVAE-653****L T/P C****Paper: Chassis Body & Transmission Lab****0 4 4**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. Writing technical specifications and description of all types of chassis.
2. Writing technical specifications and description of all types of transmission components of automobiles.
3. Writing technical specifications and description of all types of body and interiors (two wheeler, four wheeler and heavy vehicle – one each).
4. Study and analysis of trouble shooting charts for clutch.
5. Study and analysis of trouble shooting charts for gear box.
6. Study and analysis of trouble shooting charts for differential.
7. Study and analysis of trouble shooting charts for brakes.
8. Study and analysis of trouble shooting charts for wheels with tyres.
9. Study and analysis of trouble shooting charts for steering system and suspension.
10. Dismantle and assemble of major systems (clutch system, Gear boxes, Propeller shaft, Differential, Front and Rear axles, brake system, steering system and suspension system) and identifying remedies (like backlash adjustment, brakes adjustment, bleeding of brakes)
11. Testing and servicing of electrical components like battery, starting system, ignition system, central locking system, lighting system, and alternator.
12. Experiments on microprocessors related to automobiles
13. Draw sketch of seating arrangements, seats for commercial vehicle and study the comfort levels provided for driver and passengers.
14. Draw sketches of different mechanisms of door, seat adjustments mechanisms.

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

INSTRUMENTS AND EQUIPMENT LAB**Paper Code: ETVAE-655****L T/P C****Paper: Instruments and Equipment Lab****0 3 3**

Note:- *The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.*

List of Experiments:

1. Practice on making measurement with outside micrometer.
2. Practice on making measurement with inside micrometer, cylinder bore gauge.
3. Practice on making use of special tools used in automobile workshop.
4. Identification, function of each component and working of air compressor.
5. Identification, function of each component and working of car washer.
6. Identification, function of each component, working of hydraulic hoist.
7. Identification, function of each component, working of grease and oil dispenser.
8. Identification, function of each component, working and operation of Brake drum turning lathe.
9. Identification, function of each component, working and operation of cylinder head refacing machine.
10. Identification, function of each component and working of boring and honing machines.
11. Identification and function of each component and working operation of valve refacing machine.
12. Identification, function of each component and working of fuel injector tester and testing a fuel injector.
13. To study and operate clutch fixture and valve spring testers.
14. Use of computerized wheel balancing machine.
15. Study and use of Exhaust Gas Analyzer/ smoke meter.

**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

INTERNAL COMBUSTION ENGINES

Paper Code: ETVAE-602
Paper: Internal Combustion Engines

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: Student should have studied subjects such as General Science, Physics, Mathematics and have the basic knowledge about different engineering materials being used in daily life to have an enhanced exposure. This subject provides knowledge about the different molecular structures, properties of engineering material and their effect on the strength and behavior of solids under load.

Learning Outcomes: This knowledge will be helpful to the student in co-relating molecular structures with the properties of the solid materials and the ways to enhance the properties of the materials, understanding and solving the various engineering problems.

UNIT-I**Operation fundamentals**

Working principles of IC engines, classification-SI, CI engine, 2 stroke, 4 stroke, I C engine components- constructional details and working.

[T1,T2][No. of Hrs. 11]

UNIT-II**Engine systems**

Cooling system, lubrication, fuel supply, valve operation and valve timing, ignition system

[T1,T2][No. of Hrs. 11]

UNIT-III**Fuel and combustion**

SI Engine- fuels, fuel mixture preparation, fuel combustion process, normal and abnormal combustion, products of combustion, pollutants

CI engines- fuels, fuel injection system, fuel combustion process normal and abnormal combustion, products of combustion, pollutants

[T1,T2][No. of Hrs. 11]

UNIT-IV**Performance and testing**

Engine parameters- bore, stroke, capacity, compression ratio, compression pressure

Performance parameters- Engine RPM, Torque, Power- IHP, BHP, fuel consumption, efficiency- thermal, brake

Engine testing- Measurement of IHP, BHP, Specific fuel consumption, Heat balance sheet, thermal efficiency.

[T1,T2][No. of Hrs.12]

Text Book(s):

[T1] A Course in I.C. Engine - Mathur & Sharma , Dhanpat Rai & Sons, Delhi, 1994

[T2] Internal Combustion Engines-V Ganesan, Tata McGraw Hill, Delhi, 602

Reference Book(s):

[R1] Fundamentals of I.C.Engines - J.B.Heywood, McGraw Hill International Edition

[R2] I.C. Engine - Maleev & Litchy, McGraw Hill

[R3] Modern Petrol Engine - A.W.Judge, B.I. Publications. 1983

[R4] Automobile Engineering – Anil Chhikara, Satya Prakashan, Delhi

[R4] I.C Engines and Air Pollution by Obert.

ALTERNATIVE FUELS & POLLUTION CONTROL**Paper Code: ETVAE-604****Paper: Alternative Fuels & Pollution Control**

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: The purpose of this subject is to impart adequate knowledge on alternative fuels and pollution control in the automobiles. Student should have studied subjects such as elements of automobile, General Science, Physics, Chemistry etc.

Learning Outcomes: This knowledge will be helpful to the student in understanding different types of alternative fuels for automobiles, performance of alternative fuels used in automobiles, mechanism of pollutant formation in engines, treatment and different control techniques.

UNIT-I

Introduction: Various pollutants from SI and CI engines, effects of pollutants on environment and human beings. Estimation of petroleum reserves, need for alternative fuels, potential alternative fuels (alcohols, oxygenates, hydrogen, LPG, NG, biogas, vegetable oils and fuel cell), Merits and demerits of various alternative fuels. Various vegetable oils for diesel engines, problems in using vegetable oils in diesel engines, methods to improve the engine performance using vegetable oils.

[T1, T2][No. of Hrs. 12]**UNIT-II**

Emissions from SI engines and their control: Emission formation in SI engines (CO, HC and NO_x), effect of design and operating variables on emission formation, control techniques -thermal reactor, exhaust gas recirculation, three way catalytic convertor and charcoal canister control for evaporative emission- positive crank case ventilation for blow by gas control.

[T1, T2][No. of Hrs. 11]**UNIT-III**

Emissions from CI engines and their control: Emission formation in CI engines (HC, CO, NO_x, aldehydes, smoke and particulates), effect of design and operating variables on emission formation, control techniques, exhaust gas recirculation, NO_x selective catalytic reduction, diesel oxidation catalytic convertor, diesel particulate filter, NO_x versus particulates –trade off.

[T1, T2][No. of Hrs.11]**UNIT-IV**

Emission measuring instruments and test procedures: Principle of operation of emission measuring instruments used in SI and CI engines, Measurement of CO₂ and CO by NDIR, hydrocarbon emission by FID, Chemiluminescent analyser for NO_x, Liquid and Gas chromatograph, spot sampling and continuous indication type smoke meters (Bosch, AVL and Hartridge smoke meters) emission test procedures – Euro and Bharat norms.

[T1, T2][No. of Hrs. 11]**Text Book(s):**

[T1] A Course in I.C. Engine - Mathur & Sharma , Dhanpat Rai & Sons, Delhi, 1994

[T2] Internal Combustion Engines-V Ganesan, Tata McGraw Hill, Delhi, 602

Reference Book(s):

[R1] Alternative Fuels: The Future of Hydrogen- Michael F. Hordeski, The Fairmont Press, Inc., 608

[R2] A textbook of Internal Combustion Engines Rajput R. K, 2nd edition, Laxmi Publications (P) Ltd

[R3] Alternative Fuels: Fuel Cells and Natural Gas- Society of Automotive Engineers, Incorporated, 600.

[R4] Alternative Fuels: Concepts, Technologies and Developments- Thipse S. S, Jaico Publishing House, 2010

TRACTORS, FARM EQUIPMENT AND OFF ROAD VEHICLES**Paper Code: ETVAE-606****L T/P C****Paper: Tractors, Farm Equipment and Off Road Vehicles****3 0 3****INSTRUCTIONS TO PAPER SETTERS:****MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives and Pre-requisites: Student should have studied subjects such as elements of automobile engineering and thermal engineering etc. This subject provides knowledge about different tractors, farm equipment and off road vehicles. The student will be capable of performing handling, servicing and maintenance of these vehicles..

Learning Outcomes: This knowledge will be helpful to the student in indentifying; understanding different tractors, farm equipment, off road vehicles used in agriculture and construction industry.

UNIT-I

Tractors: Development of tractor- prominent makes in India, types of engines used, fuels used, horse power requirement, human factor in tractor design, traction theory, salient features of :- Tractor chassis, clutch, power transmission and final drive, steering, brakes and wheels, power take off-draw bar working, working of hydraulic lift system, working principle of automatic draft sensing and control system.

[T1, T2][No. of Hrs. 12]**UNIT-II**

Farm Equipment: Working attachment of tractors-farm equipment – classification – auxiliary equipment – trailers and body tipping mechanism.

[T1, T2][No. of Hrs. 11]**UNIT-III**

Introduction of off Road Vehicles: Classification - their application, excavator: different types of shovel and dragline, their construction, operating principles. Production capacity and cost of production, transport equipment: various types of dumpers, main system, components and carrying capacity of dumper.

[T1, T2][No. of Hrs. 11]**UNIT-IV**

Road Making and Maintenance Machines: Different types of dozer, grader, and their construction. Operating principles, production capacity and application mechanism. Other equipment: scraper and front end loader, their construction and operation maintenance: maintenance aspect of off road vehicles.

[T1,T2][No. of Hrs. 11]**Text Book(s):**

- [T1] Tractor and Automobiles, Rodichev and G.Rodicheva, Mir Publishers, 1987
 [T2] Latest Development of Heavy Earth Moving Machinery, De, Annapurna Publishers, Dhanbad 1995

Reference Book(s):

- [R1] Road Making Machinery- Abrosimov, K. Bran Berg, A and Katayer, K., M I R. Publishers Moscow. 1971
 [R2] Moving the Earth- Nichols, Herber L (Jr.), Galgotia Publishing House, New Delhi, 1962.
 [R3] Digging of Soils by Earthmover with Power Parts- Rudnev, V. K. Oxanian Press Pvt. Ltd., N Delhi, 1985
 [R4] Design of Automotive Engines for Tractor- Kolchin. A., and V.Demidov, Mir Publishers, 1972

VEHICLE TRANSPORT MANAGEMENT
(Core Elective I)

Paper Code: ETVAE-608

Paper: Vehicle Transport Management

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives and Pre-requisites:** The main objective of this subject is to make the student able to understand to run a transport organization. The pre-requisites for this subject is that he/she should have the basic study of automobile and industrial management.*

***Learning Outcomes:** This student will be able to work in transport organization in various capacities.*

UNIT – I

The Infrastructure: Historical background, Motor vehicle act 1988, Road, Highway network, traffic control, Bus priorities, pedestrianization, out town shopping centers, Bus-stops, shelters, bus garages, requirement, layout of premises, size, function, location, design, equipment, use of machinery, garage organization, requirement of facilities at depot., legal provisions for depot. Layouts, Maintenance - preventive, breakdown, overhauling - major, minor, repair schedules & workshop, facilities.

[T1, T2][No. of Hrs.11]

UNIT – II

Organization and Management: Forms of ownership, municipal undertaking, company undertaking, traffic, secretarial and engineering departments, management, principle of transport, - internal organization-centralized control, de-centralized control, staff administration: industrial relation, administration, recruitment and training, drivers and conductors duties, training of drivers and conductors, factors affecting punctuality, welfare, health and safety.

[T1, T2][No. of Hrs. 11]

UNIT – III

Route Planning: Source of traffic, town planning, turning points, stopping places, shelters, survey of route, preliminary schedule test runs, elimination of hazards, factors affecting frequency, direction of traffic flow, community of interest, estimating, traffic volume.

Bus working and Schedules: Time table layout, uses of flat graph method of presentation, preparation of vehicle and crew schedule preparation of the duty roster, co-operation with employers, use of the vehicle running numbering determination of vehicle efficiency checking efficiency of crew, duty arrangements

[T1,T2][No. of Hrs. 11]

UNIT – IV

Fare Collections & Fare structure: Need, Principles of collection, tickets, the way bill, stage by stage, bell punch system, bell graphic system, electronic ticket machines.

Fare structure: Basis of fares, historical background, effects of competition and control, calculating average zone system, concession fares, straight and tapered scale elastic and inelastic demand co-ordination of fares concessions fares changes for workman, standard layout of fare table, anomalies double booking inter availability through booking and summation, private hire charges.

[T1,T2][No. of Hrs. 12]

Text Book(s):

[T1] Bus operation - L.D.Kitchen, Iliffe & Sons , London

[T2] Bus & coach operation - Rex W. Faulks, Butterworth Version Of 1987, London

Reference Book(s):

[R1] M.V. Act 1988 - Central Law Agency, Allahabad

[R2] The Elements Of Transportation - R.J. Eaton

[R3] Road Transport Law - L.D. Kitchen

[R4] Goods Vehicle Operation - C.S. Dubbar

TYRE TECHNOLOGY
(Core Elective-I)

Paper Code: ETVAE-610
Paper: Tyre Technology

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives and Pre-requisites:** The main objective of this subject is to make the student able to understand importance of tyre in an automobile. The pre requisites for this are that he/she should have the basic study of organic chemistry, basic automobile and manufacturing technology.*

***Learning Outcomes:** The student will be able to get a respectable position in tyre industry and can be suitably self-employed.*

UNIT – I

Introduction : Importance of tyres, history, current status, functions of pneumatic tyres, applications, types of tyres, desirable tyre properties, classification of tyres based on carcass, tyre profile, geometry, sizing & designation, tyre components, principle of pneumatic tyre, requirements of pneumatic tyres.

[T1,T2][No. of Hrs. 11]

UNIT – II

Tyre Design: General, motion forces, heat buildup, types of bonding, set of service conditions, tyre size requirements, and safety requirements: Tread design, general, role of foot print area and factors affecting tread life, various types of tread pattern. Carcass design, role of foot print area and factors affecting tread life, various types of tread pattern. Carcass design, role of various fibers used in carcass, estimation of number of piles, Bead design, single bead, multiple beads, and various configurations of wires in bead assembly.

[T1,T2][No. of Hrs. 12]

UNIT – III

Manufacture Technology: General introduction, role of various mixing ingredients, various recipes. Compound mixing, mixing equipments, extrusion of components, tyre cord, wire cord manufacture, calendaring tyre manufacture, mold procurement, component preparation, green tyre building, pre curing, curing and post curing operations/treatments.

[T1,T2][No. of Hrs. 11]

UNIT – IV

Tyre testing/ Evaluation Methods : General safety standards, carcass strength, resistance to bead unseating, machine simulation test, indoor laboratory testing, field-test on road, proving ground, latest testing techniques.

[T1,T2][No. of Hrs. 11]

Text Book(s):

- [T1] Tyre Technology- S.N. Chakravarty, Indian Rubber Institute
[T2] Tires, Encyclopedia of Chemical Technology- Kirk & Othmer

Reference Book(s):

- [R1] Pneumatic Tyre Design- E.C. Wood, Cambridge
[R2] Tire Engineering- Kovac & Rodgers, Goodyear Tire Rubber Co., Ohio
[R3] Handbook of Rubber Technology, R.Schuster, Wiley Interscience

GLOBAL WARMING & CLIMATE CHANGE
(Open Elective-IV)

Paper Code: ETVCT-614

Paper: Global Warming & Climate Change

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives & Pre-requisites: To study concepts of global warming & climatic change. To study factors responsible for global warming, impact of climatic change, national and international policies. To study and understand Kyoto mechanism. Basic knowledge of environmental studies subject is a pre requisite.

Learning outcomes: Understanding of philosophy of global warming and climatic change. Able to realize the factors responsible for global warming and corresponding climatic change. Understanding the importance and nuances of Kyoto mechanism.

UNIT-I

The Climate system: Sun, Atmosphere, Ocean, Ice and energy balance of the earth, history of climate change, human-caused climate change, impacts of climate change on human well-being and the natural world.

[T1, T2, T3][No. of Hrs. 11]

UNIT-II

Key concepts of global warming, climate change, greenhouse gas effect, Interrelationship between these three phenomenon, Green-House Effect as a Natural Phenomenon and increase in Greenhouse gas effect because of anthropogenic activities, Green House Gases (GHGs) and their Emission Sources, Global Warming Potential (GWP) of GHGs, Past Present and Future trends of global warming.

[T1, T2, T3][No. of Hrs. 11]

UNIT-III

Impacts of climate change Extreme weather events, Temperature Rise, Sea Level rise, Coastal Erosion and landslides; future impacts of global warming, global warming and the hydrological cycle, climate change impact on ecosystems and agriculture.

[T1, T2, T3][No. of Hrs. 11]

UNIT-IV

Possible remedies of global warming- various mitigation and adaptation measures taken/ proposed to combat global warming; National and International policies to combat global warming and climate change-UNFCC-Kyoto Protocol, Paris agreement its role in Climate Change; IPCC- its role in global climate protection Role of countries and citizens in containing Global Warming.

[T1, T2, T3][No. of Hrs. 12]

Text Book(s)

- [T1] Current trends in Global Environment by A.L. Bhatia (2005) Energy Sources
 [T2] Global Warming – A Very Short Introduction, Mark Maslin, oxford.
 [T3] UNFCC & IPCC reports (www.unfccc.int & <http://www.ipcc.ch/>)

Reference Book(s)

- [R1] Global Warming The Complete Briefing - John T Houghton Cambridge press
 [R2] Climate Change: A Multidisciplinary Approach, by William James Burroughs, Cambridge press
 [R3] Contemporary climatology-Robinson, Taylor and Francis group

NOTE: Seminars/ discussions should be carried out on issues pertaining to global warming and climate change among the students.

ENTREPRENEURSHIP DEVELOPMENT AND PLANNING
(Open Elective-IV)

Paper Code: ETVMS-616

Paper: Entrepreneurship Development and Planning

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objectives:** The Course Aims at Instituting Entrepreneurship Skills in the Students by giving an overview of the process of entrepreneurship. The Course aims at inculcating entrepreneurial spirit among the students.*

UNIT-I

Foundations of Entrepreneurship: What is an Entrepreneur? The benefits of Entrepreneurship. The power of small business. Class exercise- case discussion on entrepreneurs like - Dhirubhai Ambani, Karsenbhai Patel, Ramesh Babu, Kailash Katkar, Patricia Narayan etc.

[T1, T2][No. of Hrs.11]

UNIT-II

Launching Entrepreneurial Ventures: Creativity and innovation. Methods to initiate ventures. Legal challenges in Entrepreneurship ventures. The search for Entrepreneurial capital. Class exercise- Survey your locality and come up with at least one entrepreneurial venture. Discuss in class about ways to enhance the business in most innovative manner.

[T1, T2][No. of Hrs.11]

UNIT-III

Formulation of the Entrepreneurial Plan: The assessment functions with opportunities. The marketing Aspects of new ventures. Business plan preparation for new ventures. Class Exercise- Building your own Business Plan.

[T1, T2][No. of Hrs.11]

UNIT-IV

Institutions Supporting Small Business Enterprises: Central level institutions. State level institutions. Other agencies. Industry Associations. Class exercise- discussions on current government schemes supporting entrepreneurship and finding out which scheme will most suit the business plan devised by the student.

[T1, T2][No. of Hrs.12]

Text Book(s)

[T1] Kuratko, D.F. & Rao T.V. (2012). Entrepreneurship: A South Asian Perspective. Cengage

[T2] Charantimath, P. (2009). Entrepreneurship Development: Small Business Enterprises. Pearson

References Book(s)

[R1] Naggendra S. and Manjunath V.S. (2009). Entrepreneurship and Management. Pearson

INTERNAL COMBUSTION ENGINES LAB**Paper Code: ETVAE-652****Paper: Internal Combustion Engines Lab**

L	T/P	C
0	4	4

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. Testing of Single Cylinder SI / CI engines for performance, calculate BP, Thermal, volumetric efficiencies, and BSFC with emission testing.
2. Testing of Twin Cylinder SI / CI engines for performance, calculate BP, Thermal, volumetric efficiencies, and BSFC with emission testing.
3. Testing of multi cylinder SI / CI engines for performance, calculate BP, Thermal, volumetric efficiencies, and BSFC with emission testing.
4. Study one engine performance by changing parameters like valve timing, ignition timing, carburetor nozzle jet.
5. Conduct Morse test for finding FP, IP, Indicated thermal efficiency and Mechanical efficiency.
6. Tuning of engines. Study and practice on computerized engine analyzer.
7. Overhauling cooling system of an I C Engine.
8. Overhauling Lubrication system of an I C Engine.
9. Reconditioning of oil pump of a multicylinder engine.
10. Practice in measuring pollution of CI/SI engine.



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UNIVERSITY**

ALTERNATIVE FUELS & POLLUTION CONTROL LAB**Paper Code: ETVAE-654****L T/P C****Paper: Alternative Fuels & Pollution Control Lab****0 3 3**

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. Study of hybrid vehicle.
2. Study of solar vehicle.
3. Study of an electric vehicle.
4. Preparation of Biodiesel and blends.
5. Study of engine performance using alternative fuel like alcohol blends.
6. Study of engine performance using alternative fuel like blends of bio diesel.
7. Study of engine performance using alternative fuel like LPG.
8. Study of fuel cell technology.
9. Study and testing on MPFI Engine.
10. Study and testing on variable compression ratio engine.
11. Exhaust Emission test of petrol engines
12. Exhaust Emission test of diesel engines



**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

INDUSTRIAL TRAINING-III

Paper Code: ETVAE-656
Paper: Industrial Training-III

L	T/P	C
0	0	2

sThe objective of this training is to:

1. Expose the student to industrial training / field procedures and practices and so as to have appreciation of the size and scale of operations.
2. Co-ordinate concepts, principles and practices taught in the classroom in their application in solving field / industrial tasks / problems.

For this purpose, students are required to be sent for a period of two weeks to industry involved in servicing, manufacturing or assembling of automobile.

For effective planning and implementation of this practical training it is proposed to:

- a) Identify adequate number of industrial / field organization where students will be sent for practical training.
- b) Prepare a workbook, which can be used by student for guiding student to perform definite task during the practical training.
- c) Identification of teachers who would supervise the student and provide guidance during practical training.
- d) Design a schedule of training, to be followed by a student. Copy of this training programme is to be given to training in-charge of the organization for implementation and proper training.



**GURU GOBIND SINGH
 INDRAPRASTHA
 UNIVERSITY**

VEHICLE TRANSPORT MANAGEMENT LAB
(Core Elective-I)

Paper Code: ETVAE-658

Paper: Vehicle Transport Management Lab

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. To draw the layout plan of a transport vehicle depot.
2. To plan the location of plant and machinery in a Transport Vehicle depot.
3. To draw the organizational structure of a transport organization.
4. To prepare the maintenance schedule for a fleet of transport vehicles.
5. To plan the route and schedule of operations of buses of a transport corporation.
6. To plan a fare structure for stage carriage of a transport corporation.
7. To study Regulatory Provisions for Road Safety, Road Safety Management.
8. To study Advances in Fuels & Vehicle Technology.
9. To study IT applications in STUs.
10. To study Bus Transport Planning & Operations in Urban Areas

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

TYRE TECHNOLOGY LAB
(Core Elective-I)

Paper Code: ETVAE-660
Paper: Tyre Technology Lab

L	T/P	C
0	3	3

Note:- The required list of Experiments is provided as under. The example cited here are purely indicative and not exhaustive. Attempt shall be made to perform all experiments. However, at least 8 experiments should be done in the semester. More experiments may be designed by the respective institutes as per their choice.

List of Experiments:

1. To identify different types of pneumatic tyres.
2. To identify the components of a tyre.
3. To study various types of tread patterns.
4. To identify and study the raw materials and ingredients for tyre making.
5. To study the tyre retreading/ resoling plant.
6. To carryout tyre repairs of various types.
7. To identify different wear patterns of a tyre and analyzing their causes.
8. Practice to repair a punctured tube.
9. Practice to repair the puncture of a tube less tyre.
10. Study of tyre storage pattern.

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