SCHEME OF TEACHING AND EXAMINATION

B.E. VII SEMESTER- AUTOMOBILE ENGINEERING

S. No.	Board of Study	Sub. Code	SUBJECT	PERIODS PER WEEK			SCHEME OF EXAM Theory/Practical			Total Marks	Credit L+(T+P/2
				L	T	P	ESE	CT	TA		
1.	Mech. Engg	382731(37)	Automotive Air Conditioning	3	1	-	80	20	20	120	4
2.	Mech. Engg	382732(37)	Vehicle Body Engineering & Safety	4	1	-	80	20	20	120	5
3.	Mech. Engg	337733(37)	Computer Aided Design & Manufacturing	4	1	-	80	20	20	120	5
4	Mech. Engg	382734(37)	Vehicle Dynamics	4	1	-	80	20	20	120	5
5	Refer Table - II		Professional Elective-II	4	1	-	80	20	20	120	5
6	Mech. Engg	382761(37)	Engine Reconditioning Lab	-	-	3	40	-	20	60	2
7	Mech. Engg	382762(37)	Vehicle Testing Lab	-	-	3	40	-	20	60	2
8	Mech. Engg	382763(37)	Computer Aided Design & Manufacturing Lab	-	-	3	40	-	20	60	2
9	Mech. Engg	382764(37)	Minor Project	-	-	3	100	-	40	140	2
10	Management	382765(76)	Innovative & Entrepreneurial Skills	-	-	2	-	-	40	40	1
11	Mech. Engg	382766(37)	** Practical Training Evolution/Library	-	-	1	-	-	40	40	1
			Total	19	5	15	620	100	280	1000	34

L – Lecturer T – Tutorial,
P – Practical, ESE – End Semester Exam, CT – Class Test
TA – Teacher's Assessment
**To be completed after VI sem. and before the commencement of VII Sem.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Table – II

Professional Elective - II

S.No.	Branch	Subject Code	Subject
1	Automobile	382741(82)	Advanced Theory Of I.C Engines
2	Automobile	382742(82)	Auto Pollution Control
3	Automobile	382743(82)	Tribology
4	Automobile	382744(82)	Quality Control & Total Quality Management
5	Automobile	382745(82)	Tractor & Farm Equipments
6	Automobile	382746(82)	Computer Simulation of I.C Engine Process
7	Automobile	382747(82)	Artificial Intelligence & Expert Systems

Note: (1) $1/4^{th}$ of total strength of students subject to minimum of 20 students is required to offer and elective in the college in a particular academic session.

Note: (2) Choice of elective course once made for an examination cannot be changed in future examinations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semester: VII**
Subject: Automotive Air Conditioning **Code: 382731(37)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

UNIT - I

AIRCONDITIONING FUNDAMENTALS

Basic air conditioning system - Location of air conditioning components in a car - Schematic layout of a refrigeration system. Compressor components - Condenser and high pressure service ports. Thermostatic expansion valve - Expansion valve calibration - Controlling evaporator temperature - Evaporator pressure regulator - Evaporator temperature regulator.

UNIT - II

AIR CONDITIONER - HEATING SYSTEM

Automotive heaters - Manually controlled air conditioner - Heater system - Ford automatically controlled air conditioner and heater systems - Automatic temperature control - Air conditioning protection – Engine protection.

UNIT - III

REFRIGERANTS

Classification, Nomenclature, selection of Refrigerants, global warming potential of CFC Refrigerants.

REFRIGERATION EQUIPMENTS
Compressor, condenser, evaporator, expansion devices – types & working.

UNIT - IV

AIR ROUTING & TEMPERATURE CONTROL

Objectives - Evaporator care airflow through the Dash recirculation unit - Automatic temperature control – Duct system - Controlling flow - Vacuum reserve - Testing the air control and handling systems.

UNIT - V

TROUBLE SHOOTING AND SERVICE

Causes of air conditioner failure - Trouble shooting of air controlling system - Air conditioner maintenance and service - Servicing heater system. Removing and replacing components – leak testing - Compressor service.

TEXT BOOK:

1. William H Crouse and Donald L Anglin, *Automotive Air conditioning*, McGraw-Hill Inc., 1990.

REFERENCE BOOKS

1. Dwiggins, *Automotive Air Conditioning* , Thomson Asia, 2002
2. Mitchell information Services, Inc., *Mitchell Automatic Heating and Air Conditioning Systems*, Prentice Hall Ind., 1989.
3. Paul Weiser, *Automotive Air Conditioning*, Reston Publishing Co Inc., 1990.
4. MacDonald.K.L, *Automotive Air Conditioning*, Theodore Audel series, 1978.
5. Goings. L.F., *Automotive Air Conditioning*, American Technical services, 1974.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Vehicle Body Engineering and Safety **Code: 382732(37)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80 Minimum marks: 28**

COURSE OBJECTIVES
At the end of the course, students will be able to know
1. Car body details
2. Vehicle aerodynamics
3. Bus body, Commercial Vehicle details
4. Body material and mechanisms

UNIT 1

CAR BODY
Types: Saloon, Convertibles, Limousine, Estate Van, racing and sports car - Driver's seat, Body Mechanisms - window winding, Door lock, seat adjustment. Driver's visibility and tests for visibility. Minimum space requirements and methods of improving space in cars. Safety - safety design, safety equipments. Car body construction.

UNIT 1I

VEHICLE AERODYNAMICS
Objectives -Vehicle drag and types - various types of forces and moments -Effects of forces and moments – Side wind effects - Various body optimization techniques for minimum drag –Wind tunnel testing: Flow visualization techniques, Scale model testing, Component balance to measure forces and moments. Simple problems.

UNIT 1II

BUS BODY
Types: Mini bus, single and double decker, two level, split level and articulated bus. Bus body layout – Floor height - Engine location - Entrance and exit location - Seating dimensions. Constructional details: Frame construction, Double skin construction -Types of metal section used - Regulations -Conventional and integral type construction.

UNIT 1V

COMMERCIAL VEHICLE
Types: Flat platform, drop side, fixed side, tipper body, tanker body. LCV body types: pickup, van. Dimensions of driver's seat in relation to controls and steering angle -Driver cab design.

UNIT V

BODY MATERIALS, TRIM AND MECHANISMS
Aluminium alloy sheet, extrusion and casting, stainless steels, alloy steels, Metal Matrix Composites. Structural timbers - properties. Designing in GRP and high strength composites, Thermo plastics, Load bearing plastics, semi-rigid PUR foams and sandwich panel construction. Corrosion, Anticorrosion methods. Selection of paint and painting process -Body trim items.

TEXT BOOK
1. Vehicle Body Engineering -Powloski.J,Business Boob Ltd., 1989

REFERENCE BOOKS:
1. Body construction and design -Giles.J.C,Iliffe Boob Butterworth & Co., 1971.
2. Vehicle Body layout and analysis -John Fenton,Mechanical Engg Publication Ltd., London, 1982.
3. Vehicle Body building and drafting -Braithwaite. J.B, Heinemann Educational Book-I Ltd., London, 1977.
4. The Passenger Car Body -Dieter Anselm, , ISBN Number: 0-7680-0708-9, SAE International, 2000.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Computer Aided Design & Manufacturing **Code: 337733(37)**
Total No. of Periods: 2 per week **Total Tutorial Periods: Nil**
Class Tests:2(minimum) **Assignments: 2(minimum)**
Teachers's Assessment:40 Marks **Maximum Marks: NA** **Minimum marks:NA**

UNIT – I

Introduction CAD/CAM
The influence of computers on manufacturing environment, Introduction of CAD/CAM, the product cycle & CAD/CAM, automation and CAD/CAM, the common database as linkage to various computerized applications. Product engineering, Benefits of CAD/CAM, Concurrent engineering.

UNIT – II

Geometric Modeling
Data base: Design database concept, objectives, data structures, creation of data files in application programs and relational database management system.
Requirement of Geometric Modeling, Geometric models, Geometric construction Methods, other modeling methods, curve representation, desirable modeling facilities & rapid prototyping.
3D representation of surfaces and solids; Plane surface, surfaces of revolution, Bezier surfaces, spline surfaces, Solid entities, basic set theory.

UNIT – III

Numerical Control
Introduction to Numerical Control, Basic components of an NC system, the NC procedure, NC coordinate systems, NC motion control systems, applications of Numerical Control, Introduction to Computer Control in NC, problems with conventional NC, Computer Numerical Control, Direct Numerical Control, Combined DNC/CNC system, Adaptive control machining system,

NC Part Programming
Introduction to NC Part Programming, Manual part programming, Computer assisted part programming, the APT (Automatically Programming Tool) language, MACRO statement in APT, Advantages of CAD/CAM in NC programming.

UNIT – IV

Group Technology
introduction to group technology, part families, parts classification & coding, three parts classification & coding system, group technology machine cells, benefits of group technology
Computer integrated manufacturing (CIM) system
Introduction of CAPP, Flexible manufacturing system, benefits.

UNIT V

Finit Element method
Introduction, types of analysis, general procedure of finite element analysis- stiffness matrix, solution procedure, one dimensional problem.

TEXT BOOKS
1. CAD/CAM Principles & Applications – P.N. Rao – TMH Publication
2. CAD/CAM Computer Aided Design & Manufacturing – Mikell P. Groover, Emory W. Zimmer - Pearson Education
3. Concept and application of Finite element analysis, R D Cook, John Wiley

REFERENCES BOOKS
1. CAD/CAM Theory & Practice – Ibrahim Zied – TMH Publication
2. CAD/CAM – Surendra Kumar & A.K. Jha – Dhanpat Rai & Company
3. Finite element analysis

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Vehicle Dynamics **Code: 382734(37)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours
Maximum Marks: 80 **Minimum marks: 28**

COURSE OBJECTIVE
When the vehicle is at dynamic condition more vibration will be produced. It is essential to study about vibrations and how to reduce the vibration under different loads, speed and road conditions in order to improve the comfort for the passengers and life of the various components of the vehicle. In this subject these aspects have been given

UNIT I

INTRODUCTION
Fundamentals of vibration, single degree of freedom, two degree of freedom, multi degree freedom, free, forced and damped vibrations, modeling and simulation studies, model of an automobile, magnification factor, transmissibility, vibration absorber.

UNIT II

STABILITY OF VEHICLES
Load distribution, calculation of acceleration, attractive effort and reactions for different drives, stability of a vehicle on a curved track, slope and a banked road,

UNIT III

MULTI DEGREE FREEDOM SYSTEMS
Closed and far coupled system, eigen value problems, orthogonality of mode shapes, modal analysis, forced vibration by matrix inversion.

UNIT IV

SUSPENSION, TYRES AND VEHICLE HANDLING
Requirements, sprung mass frequency, wheel hop, wheel wobble, wheel shimmy, choice of suspension spring rate, calculation of effective spring rate, vehicle suspension in fore and aft, roll axis and vehicle under the action of side forces, tyre, dynamics, ride characteristics power consumed by a tyre. Over steer, under steer, steady state cornering, effect of braking, driving torques on steering, effect of camber, transient effects in cornering.

UNIT V

NUMERICAL METHODS
Approximate methods for determining fundamental frequency, Dunkerleys lower bound, Rayleighs upper bound, Holzer method for closed coupled system and branched systems.

TEXT BOOKS
1. Theory and Practice of Mechanical Vibrations -Rao J.S and Gupta.K, Wiley Eastern Ltd.,2002.
2. Automotive Mechanics -Giri N.K, Khanna Publishers, 2007.

REFERENCES
1. Tyre and Vehicle Dynamics -Ham B, Pacejka -SAE Publication - 2002.
2. Vehicle Dynamics Ellis.J.R - Business Books Ltd., London- 1991
3. Fundamentals of Vehicle Dynamics- Gillespie T.D,SAE USA 1992.
4. Suspension and Tyres -Giles.J.G.Steering, Illiffe Books Ltd., London- 1998

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semester: VIII**
Subject: Engine Reconditioning Lab **Code: 382761(37)**
Total Lab Periods: 24 **Batch Size: 30**
Maximum Marks: 40 **Minimum Marks: 20**

INSTRUCTIONAL OBJECTIVES

To familiarize the students in

1. Engine Reboring and Crank shaft grinding
2. Valve repairing and refitting
3. Fuel system reconditioning

LIST OF EXPERIMENTS

1. Engine Reboring
2. Crank shaft grinding
3. Valve Seat grinding and Valve Lapping.
4. Silencer Decarbonising
5. Fuel Nozzle reconditioning
6. Fuel Injection Pump Calibration

REFERENCES

1. Manufacturer's Manual
2. Lab Manual

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semester: VIII**
Subject: Vehicle Testing Lab **Code: 382762(37)**
Total Lab Periods: 24 **Batch Size: 30**
Maximum Marks: 40 **Minimum Marks: 20**

PURPOSE

To provide practical knowledge about Vehicle testing.

INSTRUCTIONAL OBJECTIVES

At the end of the course, students will be able to know

1. About testing of automobiles using dynamometers and on Road
2. Engine analysis using diagnostic Systems
3. Wheel Balancing and alignment.
4. Exhaust gas analysis

LIST OF EXPERIMENTS

1. Testing of 2 -wheeler using chassis dynamometer.
2. Testing of 4 -wheeler using chassis dynamometer.
3. Road Test of Vehicles for
   a) Brake
   b) Acceleration
   c) Fuel Consumption
4. Engine Analysis using Engine Diagnostic System for
   a) Petrol Engine
   b) Diesel Engine.
5. Wheel Balancing and Wheel Alignment
6. Study of Chemiluminescent NOx analyzer.
7. Measurement of HC, CO, CO_2, O_2 using exhaust gas analyzer.
8. Diesel smoke measurement.

REFERENCES

1. Manufacturer's Manual
2. Giles.J.G., *Vehicle Operation and performance*, lliffe Books Ltd., London, 1989.
3. Crouse.W.H. and Anglin.D.L., *Motor Vehicle Inspection*,McGraw Hill Book Co., 1978.
4. Ganesan.V., *Internal Combustion Engines*, 2nd edition, Tata McGraw Hill Co., 2003.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semester: VIII**
Subject: Computer Aided Design Lab **Code: 382763(37)**
Total Lab Periods: 24 **Batch Size: 30**
Maximum Marks: 40 **Minimum Marks: 20**

EXPERIMENTS TO BE PERFORMED

CAD (MINIMUM FIVE EXPERIMENTS)

1. Introduction & different features of the CAD Software
2. 2-D Drafting
3. 3-D Modeling
4. 3-D Advanced Modeling
5. Assembly modeling
6. Feature Modification and Manipulation
7. Detailing
8. Sheet Metal Operations
9. Surface Modeling
10. One Dimensional problems of Finite Element Method.

(These exercises may be performed by any of the following Advanced CAD Software)

CAM (MINIMUM FIVE EXPERIMENTS)

1. To prepare part programming for plain turning operation.
2. To prepare part programming for turning operation in absolute mode.
3. To prepare part program in inch mode for plain turning operation.
4. To prepare part program for taper turning operation.
5. To prepare part program for turning operations using turning cycle.
6. To prepare part program for threading operation.
7. To prepare part program for slot milling operation.
8. To prepare part program for gear cutting operation.
9. To prepare part program for gear cutting using mill cycle.
10. To prepare part program for drilling operation.
11. To prepare part program for multiple drilling operation in Z-axis.
12. To prepare part program for multiple drilling in X-axis.
13. To prepare part program for multiple drilling in X and Z axis using drilling cycle.

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Computer Numerically Control Lathe Trainer
2. P-IV (IBM) 2.6 GHz, 80 GB HDD,256/512 SD RAM(As Compatible with CAD Software) 52 X CD RW, 1.44 MB FDD, 17" Colour Monitor, Laser Scroll Mouse
3. Software – Pro-E, Solid-work, CATIA, ANSYS
4. CNC Controlled Milling Machine
5. CNC Controlled Drilling Machine

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Advanced Theory of I.C Engines **Code: 382741(82)**
Total Theory Periods: 45 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

UNIT I

COMBUSTION IN SI ENGINES
Stages of combustion - ignition, flame propagation, factors affecting flame structure and speed, cycle by cycle variations, misfire, knock and pre-ignition. Factors controlling combustion chamber design. Combustion in diesel engines, comparison of different combustion systems, fuel spray structure and factors affecting it. Models for combustion in SI and CI engines.

UNIT II

GAS EXCHANGE PROCESSES
Gas exchange processes in two and four stroke engines, factors affecting volumetric efficiency, flow through valves and ports, multi valve concept. Charge motion within the cylinder.Turbocharging and Turbocharger control. Different methods of charging and scavenging two stroke engines.

UNIT III

COMBUSTION ANALYSIS
Introduction to HWA, LDA and PIV systems to analyse engine flows. Engine heat transfer and energy balance, correlations for heat transfer coefficient, variables affecting heat transfer in engines. Cylinder pressure data acquisition and thermodynamic analysis of engine pressure data to yield heat release rates.

UNIT IV

ALTERNATIVE FUELS
Alternative gaseous and liquid fuels for SI and CI engines, Alcohols, Biogas, LPG, CNG, Hydrogen, Biodiesel and Straight Vegetable oils, their properties and characteristics when used as engine fuels. Production, storage and distribution of different alternative fuels.

UNIT V

RECENT DEVELOPMENTS
Homogeneous charge compression ignition, Stratified charge and gasoline direct injection, Dual fuel, lean burn and Hot surface Ignition engine concepts. Hybrid Electric Drives.

TEXT BOOKS:
1. Internal Combustion Engines by V. Ganesan, 2007, Tata Mc Graw Hill
2. Internal Combustion Engine Fundamentals, John B Heywood, Mc Graw Hill
3. Advanced Engine Technology by Heisler, SAE Publication

REFERENCES:
1. Internal Combustion Engines by Richard Stone, Macmillan Book Company also SAE Publications
2. Internal Combustion Engines by Colin R Ferguson, John Wiley and Sons
3. Design and Simulation of Two Stroke Engines, GP Blair SAE Publications

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Automotive Pollution Control **Code: 382742(82)**
Total Theory Periods: 45 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

UNIT I

MECHANISM OF POLLUTANT FORMATION IN ENGINES
Introduction, Pollutants, sources, formation of HC and CO in SI engines, NO formation in SI and CI engines, Particulate emission from SI and CI engines, Smoke Emission in CI engines. Effect of operating variables on emission formation.

UNIT II

POST COMBUSTION TREATMENTS
Introduction, physical conditions and exhaust gas compositions before treatment, catalytic mechanism. Thermal Reactions, installation of catalyst in exhaust lines, NO_x treatment in diesel engines. Diesel trap oxidizers

UNIT III

CONTROL TECHNIQUES
Pollution control in SI and CI engines, design changes, optimization of operating factors, exhaust gas recirculation, fuel Additives to reduce smoke and particulates.

UNIT IV

INSTRUMENTATION FOR POLLUTION MEASUREMENTS
NDIR analyzers, thermal conductivity and flame ionization detections, analyzers for NOx, gas chromatograph, Orsat apparatus, smoke meters - spot sampling and continuous indication types like Bosch, Hartridge.

UNIT V

LAWS AND REGULATION
Historical background, regulatory test procedures (European cycles), exhaust gas pollutants (European rail road limits), particulate pollutants, European statutory values, inspection of vehicles in circulation (influence of actual traffic conditions and influence of vehicle maintenance) Indian Emission Standards.

TEXT BOOKS

1. Springer and Patterson, *Engine Emission*, Plenum Press, 1990.
2. W.M. Crouse and A.L. Anglinm, Automotive emission control, McGraw Hill Co., New Yark 1993.

REFERENCE BOOKS

1. Ganesan.V., *Internal Combustion Engines*, 2nd edition, Tata McGraw Hill Co, 2003.
2. Obert.E.F., *Internal Combustion Engines*, Harper and Row, 1982.
3. Taylor.C.F., *Internal Combustion Engines*, MIT Press, 1972.
4. Heywood.J.B., *Internal Combustion Engine Fundamentals*, McGraw Hill Book Co., 199

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Tribology **Code: 382743(82)**
Total Theory Periods: 45 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

UNIT – I

Introduction
Nature of surfaces and contact, surface topography, friction and wear mechanisms and effect of lubricants, methods of fluid film formation.
Selection of rolling element bearings
Nominal life, static and dynamic capacity, equivalent load, probabilities of survival, cubic mean load, bearing mounting details, preloading of bearings, condition monitoring using shock pulse method.

UNIT - II

Hydrodynamic bearings
Fundamentals of fluid film formation - Reynold's equation; Hydrodynamic journal bearings - Somerfield number - performance parameters - optimum bearing with maximum load capacity - friction - heat generated and heat dissipated. Hydrodynamic thrust bearings: Raimondi and Boyd solution for hydrodynamic thrust bearings - fixed and tilting pads, single and multiple pad bearings - optimum condition with largest minimum film thickness.

UNIT - III

Hydrostatic bearings
Thrust bearings - pad coefficients - restriction - optimum film thickness - Journal bearings - design procedures.
Aerostatic bearings: thrust bearings and journal bearings, design procedure.
Dry rubbing bearings
Porous metal bearings and oscillatory journal bearings, qualitative approach only.

UNIT - IV

Lubrication
Choice of lubricant type, oil, grease and solid lubricants, additives, lubrication systems and their selection, selection of pump, filters, piping design, oil changing and oil conservation.

UNIT - V

Seals
Different types, mechanical seals, lip seals, packed glands, soft piston seals, mechanical piston rod packing, labyrinth seals and throttling bushes, oil flinger rings and drain grooves, selection of mechanical seals.
Failure of tribological components
Failure analysis of plain bearings, rolling bearings, gears and seals, wear analysis using SOAP and Ferrography.

TEXT BOOKS
1. Fundamentals of Tribology – S.K. Basu, S.N. Sengupta & B.B. Ahuja – PHI
2. Engineering Tribology – Prasanta Sahoo - PHI

REFERENCES BOOKS
1. Tribology Handbook - Neale M J - Neumann Butterworths, 1975 Standard handbook of lubrication engineers - J J O' Connor & Boyd - ASLE, McGraw Hill Book Co., 1968
2. Hydrostatic and Hybrid Bearing Design - Rowe W W & O' Dionoghue - Butterworths & Co. Publishers Ltd,1983

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Quality Control & Total Quality Management **Code: 382744(82)**
Total Theory Periods: 45 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

UNIT-I

Basic Concept of Quality
Quality and quality control, concept of quality, quality characteristics, Quality of design and quality of conformance, History of quality control, Quality policy and objectives, Economics of quality.

Statistical Concept of Variation
Concept of variation frequency distribution, continuous and discrete, probability distributions viz. Normal, Exponential and weibull distribution, pattern of variation, significance tests, Analysis of variance, statistical aids in limits and tolerances.

UNIT-II

Quality Assurance
Concept, advantages, field complaints, quality rating, quality audit, inspection planning, quality mindness, quality budget, vendor quality rating (VQR), vendor rating (VR), manufacturing planning for quality, Quality function deployment (QFD).

Statistical Quality Control
Objectives, Growth and applications of S.Q.C.,S.O.C, Techniques in manufacturing planning. Process capability analysis, Control charts for variables and attributes and their analysis, process capability, concept of six sigma.

UNIT III

ACCEPTANCE SAMPLING
Fundamental concept in acceptance sampling, operating characteristics curve. Acceptance plans, single, double and introduction of multiple plans, LTPD, AOQL, AOQ.

UNIT -I V

Total Quality Management
Total Quality Control (TQC), Concept of Total Quality Management (TQM), TQM philosophies, Deming approach to TQM, Juran ten steps to Quality Management, Taguchi Philosophy, Crosby fourteen steps, TQM models, Tools and techniques of TQM,

UNIT V

Quality system
Quality system, need for quality system, ISO 9000 Quality Managmeent Standards, ISO 9000:2000 requirement, Quality Auditing, ISO 14000, Benefits of ISO 14000.

TEXT BOOKS
1. Quality Planning and Analysis by Juran J.M. and Gryana FM. – McGraw Hill, New York
2. Statistical Quality Cntrol – R.C. Gupta – Khanna Publishers, Delhi
3. Statistical quality control – E. L. Grant and R. S. Leavenworth – Mc. Graw Hill, New York

REFERENCE BOOKS
4. Engineering Statistics and quality control – I. W. Burr, Mc. Graw Hill, New York
5. Managing for Total quality from Deming to Tguchi and SPC. - Logothetis – Prentice Hall of India
6. Statistical Quality Control – M. Mahajan – Dhanpat Rai & Company – New Delhi

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Tractor &Farm Equipments **Code: 382745(82)**
Total Theory Periods: 45 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

COURSE OBJECTIVES

At the end of the course, students will be able to know

- The general design of tractors.
- Control of the tractors and fundamentals of Engine operation.
- Engine Frame work and Valve mechanism of Tractor.
- Cooling system, lubrication system and Fuel system of tractors.
- Farm equipments.

UNIT-I

GENERAL DESIGN OF TRACTORS

Classification of tractors - Different types and purpose - Main components of tractor – Safety rules.

UNIT-II

CONTROL OF THE TRACTOR AND FUNDAMENTALS OF ENGINE OPERATION

Tractor controls and the starting of the tractor engines - Basic notions and definition - Engine cycles – Operation of multi cylinder engines - General engine design - Basic engine performance characteristics.

UNIT-III

ENGINE FRAME WORK AND VALVE MECHANISM OF TRACTOR

Cylinder and pistons - Connecting rods and crankshafts - Engine balancing - Construction and operation of the valve mechanism - Valve mechanism components - Valve mechanism troubles.

UNIT-IV

COOLING SYSTEM, LUBRICATION SYSTEM AND FUEL SYSTEM OF A TRACTOR

Cooling system - Classification - Liquid cooling system - Components, Lubricating system servicing and troubles - Air cleaner and turbo charger - Fuel tanks and filters - Fuel pumps.

UNIT-V

FARM EQUIPMENTS

Working attachment of tractors - Farm equipment - Classification - Auxiliary equipments - Trailers and body tipping mechanism.

TEXT BOOKS

1. Tractor and Automobiles -Rodichev and Rodicheva. G, MIR Publishers, 1987.
2. Design of Automotive engines for tractor -Kolchin. A and Demidov. V,MIR Publishers, 1972.

REFERENCE BOOK

1. Tractors and their power units John B Lllzedaw et-al.,.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Automobile Engineering **Semster: VII**
Subject: Computer Simulation of I.C Engine Process **Code: 382746(82)**
Total Theory Periods: 45 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

UNIT-I

INTRODUCTION
Introduction - Heat of reaction - Measurement of URP - Measurement of HRP - Adiabatic flame temperature: Complete combustion in C/H/O/N Systems, Constant volume adiabatic combustion, constant pressure adiabatic combustion. Calculation of adiabatic flame temperature - Isentropic changes of state.

UNIT-II

SI ENGINE SIMULATION WITH AIR AS WORKING MEDIUM
Deviation between actual and ideal cycle - Problems, SI engine simulation with adiabatic combustion, temperature drop due to fuel vaporization, full throttle operation - efficiency calculation, part-throttle operation, super charged operation.

UNIT-III

PROGRESSIVE COMBUSTION
SI Engines simulation with progressive combustion with gas exchange process, Heat transfer process, friction calculation, compression of simulated values, validation of the computer code, engine performance simulation, pressure crank angle diagram and other engine performance.

UNIT-IV

SIMULATION OF 2-STROKE SI ENGINE
Introduction – Air fuel mixture formation – Chemically correct mixture combustion – Scavenging – Exhaust and mixing processes in a two stroke engine.

UNIT-V

DIESEL ENGINE SIMULATION
Multi zone model for combustion, different heat transfer models, equilibrium calculations, simulation of engine performance and simulation for pollution estimation.

TEXT BOOKS

1. Computer Simulation of Spark - Ignition Engine Process -Ganesan.V. Universities Press (I) Ltd, 1996.
2. Computer Simulation of Compression - Ignition Engine Process -Ganesan.V., Universities Press (I) Ltd, 2000.

REFERENCE BOOKS

1. Modeling of Internal Combustion Engines Processes -Ramoss.A.L., McGraw Hill Publishing Co.,1992.
2. Thermodynamic analysis of combustion engines -Ashley Campbel, John Wiley & Sons, New York,1986.
3. Internal Combustion Engines -Benson.R.S., Whitehouse.N.D.,Pergamon Press, Oxford, 1979.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semster: VII**
Subject: Artificial Intelligence & Expert Systems **Code: 382747(82)**
Total Theory Periods: 45 **Total Tutorial Periods: 10**
Class Tests:2(minimum) **Assignments: 2(minimum)**
ESE duration: 3 hours **Maximum Marks: 80** **Minimum marks: 28**

COURSE OBJECTIVES

To familiarize

- Basic concepts of artificial intelligence
- Various steps involved in artificial intelligence
- Basic concepts of expert systems

UNIT-I

INTRODUCTION

History, Definition of A.I., Emulation of Human cognitive process. The knowledge search tradeoff, stored knowledge, semantic nets, An abstract view of modeling ,Elementary knowledge. Computational Logic, Analysis of compound statements using simple logic connectives, predicate logic, knowledge organization and manipulation, knowledge acquisition.

UNIT-II

PROBLEM SOLVING AGENTS

Problem Definition - formulating Problems, Searching for Solutions, Measuring Problem, Solving Performance with Examples. Search Strategies-Uninformed or Blinded Search, Breadth First Search, Uniform Cost Search, Depth First Search, Depth Limited Search, Iterative Deepening Depth First Search, Bi-directional Search, Comparing Uniformed Search Strategies. Informed Search Strategies- Heuristic Information, Hill Climbing Methods, Best-First Search, Branch-and-Bound Search, Optimal Search and A* and Iterative Deepening A*

UNIT-III

KNOWLEDGE ORGANISATION, COMMUNICATION

Matching Techniques -Need for matching, Matching problem, Partial matching, fuzzy matching, RETE matching algorithm. Knowledge organization-Indexing and Retrieval techniques, integration of knowledge in memory organization systems, Perception, Communication and Expert System. Overview of linguistics-Basic semantic Analysis and representation structures, natural language generation.

UNIT-IV

INTRODUCTION TO PROGRAMMING LANGUAGE

Introduction to Programming Language of AI and Its Advantages, Introduction to Lisp and Its Syntax, Lisp Syntax - Numeric Function, Difference Between Lisp and Prolog, Lisp Syntax – Input Statements, Output Statements and Declaration of Local Variables, Interaction and Recursion Functions, Property List and Arrays.

UNIT-V

EXPERT SYSTEMS

Expert System- Introduction, Difference Between Expert System and Conventional Programs, Basic Activities of Expert System- Interpretation, Prediction, Diagnosis, Design, Planning, Monitoring, Debugging, Repair, Instruction, Control, Basic Aspect of Expert System- Acquisition Module Frames, Knowledge Base, Production Rules, Semantic Net, Inference Engine- Backward Chaining and forward Chaining. Explanatory Interface.

TEXT BOOKS

1. Artificial Intelligence -Elaine Rich and Kelvin Knight, Tata McGraw Hill, New Delhi, 1991.
2. Artificial Intelligence: A modern approach -Stuart Russell and Peter Norvig, Prentice Hall, 1995

REFERENCE BOOKS

1. Principles of Artificial Intelligence -Nilson, N.J,Springer Verlag, Berlin, 1980.
2. Introduction to Artificial Intelligence and Expert systems -Patterson, , Prentice Hall of India, New Delhi,1990.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering **Semester: VII**
Subject: Innovation and Entrepreneurial Skill **Code: 382765(76)**
No Periods: 2 per week **Total Tutorial periods:Nil**
Maximum Marks: 40 **Minimum Marks: 24**

Unit I

Innovation: innovation- an abstract concept; creativity, innovation and imagination; types of innovation -classified according to products, processes or business organizations.

Unit II

Entrepreneurship: who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of Entrepreneurship for sustainable development.

Unit III

Difference between entrepreneur and entrepreneurship, Difference between entrepreneur and entrepreneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

Unit IV

Identification of Business Opportunities: Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

UNIT-V

Techno-Economic Feasibility of the project: Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Pro-forma of Feasibility Report, Role of Institutions and entrepreneurship.

Text and Reference Books:
1. Competing through Innovation-Bellon & Whittington, Prentice Hall of India
2. A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
3. Entrepreneurship- Rober D Hisrich, Peters, Shepherd- TMH
4. Entrepreneurship in Action- Coulter, Prentice Hall of India
5. Entrepreneurship Management and Development – Ajith Kumar, HPH