



SCHEME OF TEACHING AND EXAMINATION B.E. VIII 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	337831(37)	Robotics	4	1	-	80	20	20	120	5
2.	Mech. Engg	382832(37)	Manufacturing Technology	4	1	-	80	20	20	120	5
3.	Mech. Engg	337833(37)	Industrial Engineering & Management	4	1	-	80	20	20	120	5
4	Refer Table - III		Professional Elective-III	4	1	-	80	20	20	120	5
5	Refer Table - IV		Open Elective-IV	4	1	-	80	20	20	120	5
6	Mech. Engg	382861(37)	Robotics Lab	-	-	2	40	-	20	60	1
7	Mech. Engg	382862(37)	Manufacturing Technology Lab	-	-	2	40	-	20	60	1
8	Mech. Engg	382863(37)	Computer Aided Chassis Design Lab	-	-	2	40	-	20	60	1
9	Mech. Engg	382864(37)	Major Project	-	-	6	100	-	80	180	3
10	Mech. Engg	382865()	Report Writing & Seminar	-	-	2	-	-	40	40	1
11			Library	-	-	1	-	-	-	-	-
Total				20	5	15	620	100	280	1000	32

L – Lecturer

T – Tutorial,

P – Practical,

ESE – End Semester Exam,

CT – Class Test

TA – Teacher's Assessment

Table – III
Professional Elective - III

S.No.	Branch	Subject Code	Subject
1	Mech	337841(37)	Mechatronics
2	Automobile	382842(82)	Vibration and Noise Control in Automobiles
3	Automobile	382843(82)	Combustion Process
4	Automobile	382844(82)	Vehicle Design Characteristics
5	Mech	337845(37)	Soft Computing Techniques
6	Automobile	382846(82)	Fuel Cell Technology

Note: (1) $1/4^{\text{th}}$ of total strength of students subject to minimum strength 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.

Table - IV

Open Elective –IV			
S.No.	Board of Studies	Code	Name of Subject
1	Management	300851(76)	Enterprise Resource Planning (Except CSE & IT Branch)
2	Information Technology	300852(33)	E-Commerce & strategic IT (Except CSE & IT Branch)
3	Management	300853(76)	Technology Management
4	Information Technology	300854(33)	Decision Support & Executive Information system
5	Computer Science & Engg.	300855(22)	Software Technology
6	Management	300856(76)	Knowledge Entrepreneurship
7	Management	300857(76)	Finance Management
8	Management	300858(76)	Project Planning, Management & Evaluation
9	Mechanical Engg.	300859(37)	Safety Engineering
10	Computer Science & Engg.	300801(22)	Bio Informatics
11	Mechanical Engg.	300802(37)	Energy Conservation & Management
12	Nanotechnology	300803(47)	Nanotechnology
13	Management	300804(76)	Intellectual Property Rights
14	Mechanical Engg.	300805(37)	Value Engineering
15	Civil Engg.	300806(20)	Disaster Management
16	Civil Engg.	300807(20)	Construction Management
17	Civil Engg.	300808(20)	Ecology and Sustainable Development
18	Chem. Engg.	300809(19)	Non Conventional Energy Sources
19	Electrical Engg.	300810(24)	Energy Auditing & Management (Except Electrical Engg. Branch)
20	Mechanical Engg.	300811(37)	Managing Innovation & Entrepreneurship
21	Information Technology	300812(33)	Biometrics
22	Information Technology	300813(33)	Information Theory & Coding
23	Computer Science & Engg.	300814(22)	Supply Chain Management
24	Computer Science & Engg.	300815(22)	Internet & Web Technology
25	Electrical Engg.	300816(24)	Electrical Estimation and Costing
26	Electrical & Electronics Engg.	300817(25)	Non Conventional Energy Sources
27	Computer Science & Engg.	300818(22)	Big Data and Hadoop

Note (1) 1/4th of total strength of students is required to offer an elective in the college in a particular academic session.

(2) - Choice of elective course once made for an examination cannot be changed

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering

Branch: Automobile Engineering

Subject: Robotics

Total Theory Periods: 40

Class Tests:2(minimum)

ESE duration: 3 hours

Semster: VIII

Code: 337831(37)

Total Tutorial Periods: 10

Assignments: 2(minimum)

Minimum marks: 28

Maximum Marks: 80

UNIT – I

Introduction to Robotics

Evolution of Robots and Robotics, Laws of Robotics, What is and What is not a Robot, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects, Notations.

UNIT – II

Coordinate Frames, Mapping and Transforms

Coordinate Frames, Description of Objects in Space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices

UNIT – III

Symbolic Modeling of Robots – Direct Kinematic Model

Mechanical Structure and Notations, Description of Links and Joints, Kinematic Modeling of the Manipulator, Denavit – Hartenberg Notation, Kinematic Relationship between Adjacent Links, Manipulator Transformation Matrix. Introduction to Inverse Kinematic model

UNIT – IV

Robotic Sensors and Vision

The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Robotic vision, Industrial Applications of Vision-Controlled Robotic Systems, Process of Imaging, Architecture of Robotic Vision Systems, Image Acquisition, Description of Other components of Vision System, Image Representation, Image Processing.

UNIT – V

Robot Applications

Industrial Applications, Material Handling, Processing Applications, Assembly Applications, Inspection Application, Principles for Robot Application and Application Planning, Justification of Robots, Robot Safety, Non-Industrial Applications, Robotic application for sustainable Development.

TEXT BOOKS

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
2. Robotics for engineers - Yoram Korean- McGrew Hill Co.
3. Industrial Robotics Technology programming and Applications - M.P.Groover, M.Weiss, R.N.Nagel, N.G.Odrey

REFERENCE BOOKS

1. Robotics Control Sensing, Vision and Intelligence - K.S.Fu, R.C.Gonzalex, C.S.G.Lee- McGrew hill Book co.
2. Kinematics and Synthesis of linkages - Hartenberg and Denavit - McGrew Hill Book Co
3. Kinematics and Linkage Design - A.S. Hall - Prentice Hall
4. Kinematics and Dynamics of Machinery - J.Hirchhorn - McGrew Hill Book Company.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering

Branch: Automobile Engineering

Subject: Manufacturing Technology

Total Theory Periods: 40

Class Tests: 2 (minimum)

ESE duration: 3 hours

Semster: VIII

Code: 382832(37)

Total Tutorial Periods: 10

Assignments: 2 (minimum)

Minimum marks: 28

Maximum Marks: 80

UNIT I

Grinding: Processes. Grinding wheels, compositions- abrasives, bonding materials. Grinding wheel Characteristics- abrasive type, grain size, bonding material, structure, and grade. Wheel specification and selection. Wheel life. Types of grinding operations, design consideration for grinding, specification of grinding wheel, process parameters, economics of grinding. Surface finishing operations: Honing, lapping, super finishing, polishing, buffing, process parameters and attainable grades of surface finish.

UNIT II

Unconventional Machining: Advantages, application and limitation, Processes- Electro Discharge Machining (EDM), Electro Chemical Machining (ECM), Ultrasonic Machining (USM), Abrasive Jet Machining (AJM), Electron Beam Machining (EBM), Laser Beam Machining (LBM), Electro Chemical grinding (ECG). Mechanics of metal removal, tooling, equipment, process parameters and surface finish obtained & specific applications.

UNIT III

Introduction to metal forming: Classification, Hot and Cold working.

Forging: Principle. Forging operations, drawing out and upsetting. Types of forging method- smith, drop, press and machine forging. Forging equipment. Forging dies. Tools and fixture of forging, forging dies. Forging design, Forging designs factors. Drop forging die design, Upset forging die design. Forging practice – sequence of steps. Forging defects. Inspection and testing of forged parts.

Extrusion: Principle, extrusion processes- hot extrusion, cold extrusions. Process parameters. Extrusion equipment. Extrusion of seamless tubes. Extrusion defects.

UNIT IV

Rolling : Principle, classification of rolled products, Types of rolling mills, rolling mill train components, Roll pass sequences- break down passes, roughing passes, finishing passes. Roll passes design for continuous mill. Roll separating force. Rolling load calculation. Power required in rolling. Effect of front and back tensions. Effect of friction. Shape rolling operations- ring rolling, thread rolling. Defects in rolled products. Drawing: Principle. Wire drawing, tube drawing. Drawing equipments and dies. Calculation of drawing load and power requirement

UNIT V

Sheet metal forming

Types of presses: Selection of press, components of a simple press, press working operations – shear, bending. Shearing operations: Blanking, piercing, trimming, shaving, nibbling and notching. Calculation of punching force and shear force. Punch and die size calculation. Drawing operation: Principle of operation. Draw die design.

Bending operation: Principle of operation. Bend allowances. Bending force. Length of sheet estimation. Bend radius. Spring back effect. Other operation: Spinning. Stretch forming, Embossing and Coining.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Manufacturing Engineering and Technology – S. Kalpakjian & S.R. Schmid – Addison Wesley Longman, New Delhi
2. Tool Engineering & Design – G.R. Nagpal – Khanna Publishers – New Delhi
3. A Text Book of Production Technology – O.P. Khanna – Dhanpat Rai & Sons, New Delhi
4. Manufacturing Science – A. Ghosh & A.K. Mallik – East West Press Pvt. Ltd., New Delhi
5. Production Technology – R.K. Jain – Khanna Publishers, New Delhi

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Industrial Engineering & Management
Total Theory Periods: 40
Class Tests: 2 (minimum)
ESE duration: 3 hours

Semster: VIII
Code: 337833(37)
Total Tutorial Periods: 10
Assignments: 2 (minimum)
Minimum marks: 28
Maximum Marks: 80

Unit-I

Introduction

History & development, objective, place of Industrial Engineering in an organization, relation with other department, system approach

Plant Location

Need for a suitable location, Plant location problems factors affecting location, quantitative method forevaluation of plant location.

Plant Layout

Objective & Principles, factors affecting layout, types of layout.

Unit-II

Work Study

Purpose, objectives and applications of work study, Productivity and work study.

Method Study

Introduction, procedure, flow process charts, Multiple activity chart, motion economy principles, Therbligs, cycle graph and chronocyclegraph.

Work Measurement

Definition, types, Time Study- selection & timing the job, rating, allowances, Numerical on Normal and standard time calculation.

Unit-III

Job Evaluation and Merit Rating

Definition, objectives, methods.

Wages and Incentives

Terminology, characteristics, factors, types of incentives, wage incentive plan, Rowan plan, Taylor's differential piece rate system, Emerson's efficiency plan, Halsey's 50-50 plan, Bedaux plan, Group task & Bonus system.

Unit-IV

Basic concepts and Functions of management

Nature, Purpose and Objectives of basic functions of management, Authority and Responsibility, social responsibility of manager, ethics and management.

Human Resource Management

Nature and Scope of Human Resource Planning, Recruitment and Selection, Training and Development, Career Growth, Grievances, Motivation – needs and types, Maslow hierarchy of needs theory, Herzberg two factor theory, Need-want-satisfaction chain, Quality of working life, job enrichment and job enlargement.

Unit-V

Marketing Management

Marketing Environment, Marketing Mix, Advertising and Sales Promotion, Channels of Distribution.

Financial Management

Book keeping, financial statement Analysis, Financial Ratios, Capital Budgeting, Break-Even Analysis.

TEXT BOOKS

1. Industrial Engineering and Production Management - Martand Telsang - S.Chand.
2. Industrial Engineering & Management - S. Dalele & Mansoor Ali - Standard Publishers.

REFERENCE BOOKS

1. Industrial Engineering & Management, A new perspective - Philip E Hicks - McGraw Hill
2. Company Essential of Management - H. Koonz and H. Wehrich – McGraw Hill
3. Marketing Management - Kotler Philip - Prentice Hall of India
4. Flexibility in Management - Sushil, Vikas publication - New Delhi
5. Human Resource Management - Luthans Fred - McGraw Hill, Inc.
6. Financial Management - M.Y. Khan and P.K. Jain - Tata Mc-Graw Hill
7. Fundamentals of Business Organizations and Management - Y.K. Bhusan - S. Chand
8. Industrial Management - K.K. Ahuja - Khanna Publishers
9. Introduction of work study - ILO, Geneva - Universal Publishing Corporation, Bombay
10. Motion and Time Study - Ralph M. Bannes - John Wiley & Sons
11. Work Study and Ergonomics - H.S. Shan - Dhanpat Rai & Sons

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Robotics Lab
Total Lab Periods: 24
Maximum Marks: 40

Semester: VIII
Code: 382861(37)
Batch Size: 30
Minimum Marks: 20

EXPERIMENTS TO BE PERFORMED (MINIMUM FIVE NUMBERS)

1. To detect the sensor scanning system to overcome limitation of fixed sensors on various robotic applications, Ultrasonic sensor, laser range finders, infrared detectors and miniature.
2. To find the horizontal and vertical movement up to 180o in either direction.
3. To detect objects with infrared ray detector.
4. To determine object distance (3cm – 300cm).
5. To detect distance (10cm to 80 cm) with infrared object detector.
6. To determine 5 Axis Robotic Arm movement and its degree of rotation.
7. To lift the object and place 100m away in various directions.
8. To find the gripper movement (0 to 50mm).
9. To study various Robotic Arm Configurations.
10. To study Pick and Place Robot

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. 5 Axis Robotic Arm System
2. Hex Crawler Robot. The Mechatronics Robot
3. Ultrasonic Range Finder
4. Servo Power Supply
5. Infrared Object/Distance Detector
6. A 7.2V Battery Charger
7. Blue Tooth Transducer
8. Blue Tooth Pc Adaptor
9. Various Wooden Models to study Robotic Arm Configuration
10. Working model of Pick and Place Robot

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Manufacturing Technology Lab
Total Lab Periods: 24
Maximum Marks: 40

Semester: VIII
Code: 382862(37)
Batch Size: 30
Minimum Marks: 20

List of Experiments to be Performed (Minimum ten experiments are to be performed by each student)

Foundry

1. Moulding of a multi-piece pattern by green sand moulding
2. Making a mould (with core) and casting.

Machine Tool

3. Taper turning in a Lathe
4. Thread cutting in Lathe
5. Slot cutting in Shaper
6. Gear cutting in milling machine using indexing head.
7. Alignment testing of Lathe
8. Drilling, boring and reaming of a hole.

Cutting Tool

9. Study of turning tool of Lathe (Tool signature)
10. Study of twist drill

Welding

11. Joining MS plates by arc welding (SMAW, MIG)
12. Joining metal sheet by resistance welding
13. Joining metal by soldering/brazing

Inspection and Testing

14. Inspection of casting defect and welding defects
15. Non destructive testing of casting and welding defects

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Moulding equipment
2. Melting facility
3. Lathe
4. Shaper
5. Drilling Machine
6. Milling Machine
7. Reamers
8. Arc welding equipments
9. Soldering /Brazing equipments
10. Non destructive testing equipments

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Computer Aided Chassis Design Lab
Total Lab Periods: 24
Maximum Marks: 40

Semester: VIII
Code: 382863(37)
Batch Size: 30
Minimum Marks: 20

LIST OF EXPERIMENTS

CLUTCH

1. Complete design of clutch components.
2. Assembly drawing of clutch using drafting software.

GEAR BOX

3. Gear train calculations.
4. Layout of gear box.
5. Calculation of bearing loads
6. Selection of bearings.
7. Assembly drawing of gear box using drafting software.

DRIVE LINE AND REAR AXLE

8. Design of propeller shaft.
9. Design details of final drive gearing.
10. Design details of full floating, semi-floating and three quarter floating rear shaftsand rear axle housings.
11. Design aspects of final drive.

LIST OF EQUIPMENTS

(for a batch of 30 students)

1. Computer nodes - 30 Nos.
2. Software like AutoCAD or Pro-E - 30 licenses

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering

Branch: Automobile Engineering

Subject: Report Writing & Seminar

Total No. of Periods: 2 per week

Class Tests:2(minimum)

Teachers's Assessment:40 Marks

Semster: VIII

Code: 382865(37)

Total Tutorial Periods: Nil

Assignments: 2(minimum)

Maximum Marks: NA Minimum marks:NA

Unit -I

Introduction to Technical Writing: how differs from other types of written communication Purpose of technical writing, Correspondence: prewriting, writing and rewriting Objectives of Technical Writing. Audience Recognition:High-tech audience, Low tech audience, Lay audience, Multiple Audience.

Unit - II

Correspondence: Memos, Letters, E-mails, Its differentiation, types of letters, Document Design, its importance,Electronic Communication: Internet, Intranet, extranet, Writing effective e-mail.

Unit - III

Summary: Report Strategies, Effective style of technical report writing: Structures: content, introduction,conclusions, references, etc., Presentation, Writing first draft, revising first draft, diagrams, graphs, tables, etc.report lay-out.

Unit -IV

Report Writing: Criteria for report writing, Types of Report: Trip report, Progress report, lab report, Feasibilityreport, project report, incident report, etc. Case Studies.

Unit -V

Proposals & Presentation: Title page, Cover letter, Table of Content, list of illustrations, summary, discussion,conclusion, references, glossary, appendix, Case Studies. Oral Presentation/ Seminar:

Text Books:

1. Sharon J. Gerson& Steven M. Gerson "Technical Writing - Process& Product", Pearson Education.

Reference Books:

1. Sunita Mishra, "Communication Skills for Engineers" Pearson Education
2. Davies J.W. "Communication for engineering students", Longman
3. Eisenberg, "Effective Technical Communication", Mc. Graw Hill.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Mechatronics
Total Theory Periods: 45
Class Tests:2(minimum)
ESE duration: 3 hours

Semster: VIII
Code: 337841(37)
Total Tutorial Periods: 10
Assignments: 2(minimum)
Minimum marks: 28

Maximum Marks: 80

UNIT – I

Introduction about Mechatronics, scope of Mechatronics, application, process control automation and N/c Machines.

UNIT – II

Sensors and Transducers

Introduction, classification, specification, characteristics of transducers, type of transducers-displacement, strain, vibration pressure, flow, temperature, force & torque, tactile.

UNIT – III

Hydraulic Pneumatic & Electrical actuators

Pumps & Compressors, control valves & accessories, actuators, fluid power symbols, fluid power systems, switching devices, solenoids, motors.

UNIT – IV

Data Acquisition and Control System

Introduction, Quantizing theory, Analog to Digital Conversion, Digital to Analog (D/A) conversion, transfer function, transient response & frequency response & frequency response, stability criteria.

UNIT – V

Design of Mechatronic systems

Introduction, Automatic front and back and cutting in steel rolling mill, lift control system, CNC lathe, temperature control of a heat treatment furnace, EOT crane control panel, Grey grain separators, electrode arm control in electric arc furnace.

TEXT BOOKS

1. Mechatronics, Revised – N. Shanmugam – Anuradha Agencies , 2004
2. Mechatronics – HMT Limited –8th reprint, 2003

REFERENCE BOOKS

1. Mechatronics and Measurement system – David G. Alciatore & Michal B. Histad – TMH – 2nd reprint
2. Mechatronics, 3rd Edn. – W. Bolton – Pearson Education

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering
Branch: Automobile Engineering
Subject: Vibration and Noise Control in Automobiles
Total Theory Periods: 40
Class Tests: 2(minimum)
ESE duration: 3 hours

Semster: VIII
Code: 382842(82)
Total Tutorial Periods: 10
Assignments: 2(minimum)
Minimum marks: 28
Maximum Marks: 80

UNIT – I

Basics of vibrations : Introduction, classification of vibration: free and forced vibration, undamped and damped vibration, linear and non linear vibration, response of damped and undamped systems under harmonic force, analysis of single degree and two degree of freedom systems, torsion vibration, determination of natural frequencies.

UNIT – II

Basics of noise: Introduction, amplitude, frequency, wavelength and sound pressure level, addition, subtraction and averaging decibel levels, noise dose level, legislation, measurement and analysis of noise, measurement environment, equipment, frequency analysis, tracking analysis, sound quality analysis.

UNIT – III

Automotive noise sources : Noise Characteristics of engines, engine overall noise levels, assessment of combustion noise, assessment of mechanical noise, engine radiated noise, intake and exhaust noise, engine accessory contributed noise, transmission noise, aerodynamic noise, tire noise, brake noise.

UNIT – IV

Control techniques: Vibration isolation, tuned absorbers, untuned viscous dampers, damping treatments, application dynamic forces generated by IC engines, engine isolation, crank shaft damping, modal analysis of the mass elastic model shock absorbers.

UNIT –V

Source of noise and control : Methods for control of engine noise, combustion noise, mechanical noise, predictive analysis, palliative treatments and enclosures, automotive noise control principles, sound in enclosures, sound energy absorption, sound transmission through barriers.

TEXT BOOKS

1. Bernard Challen and RodicaBaranescu - “Diesel Engine Reference Book” - 2nd Edition - SAE International - ISBN 0-7680-0403-9–
2. SingiresuS.Rao - “Mechanical Vibrations” - Pearson Education, ISBN–81-297-0179-0 - 2004.
3. KewalPujara “Vibrations and Noise for Engineers, DhanpatRai & Sons, 1992.:1999.

REFERENCE BOOKS:

1. Julian Happian-Smith - “An Introduction to Modern Vehicle Design”- Butterworth-Heinemann, ISBN 0750-5044-3 - 2004

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering

Branch: Automobile Engineering

Subject: Combustion Process

Total Theory Periods: 40

Class Tests: 2 (minimum)

ESE duration: 3 hours

Semster: VIII

Code: 382843(82)

Total Tutorial Periods: 10

Assignments: 2 (minimum)

Minimum marks: 28

Maximum Marks: 80

UNIT – I

COMBUSTION OF FUELS

Combustion equations, Theoretical air, excess air, air-fuel ratio, equivalence ratio, exhaust gas composition, Air-fuel ratio from exhaust gas composition, heating value of fuels.

UNIT – II

THERMODYNAMICS OF COMBUSTION

Thermo-chemistry, First law analysis of reacting systems, Adiabatic combustion temperature, Second law analysis of reacting systems, criterion for chemical equilibrium, Equilibrium constant for gaseous mixtures, Evaluation of equilibrium composition, chemical availability.

UNIT – III

KINETICS OF COMBUSTION

Rates of reaction, Reaction order and molecularity, complex reactions, chain reactions, Arrhenius rate equation, Collision theory, activated complex theory, Explosive and general oxidative characteristics of fuels.

UNIT – IV

FLAMES

Laminar and Turbulent flames, Premixed and Diffusion flames, Burning velocity and its determination, Factors affecting burning velocity, Quenching, Flammability and Ignition, Flame stabilization in open burners.

UNIT – V

ENGINE COMBUSTION

Combustion in SI and CI engines, stages of combustion in SI and CI engines, Normal combustion and Abnormal combustion, Emissions from premixed combustion, Emission from Non premixed combustion, Control of emissions

TEXTBOOK

1. Stephen R. Turns, *An Introduction to Combustion*, McGraw Hill Book Company, 1996.

REFERENCE BOOKS

1. Irwin Glassman, *Combustion*, Third Edition, Academic Press, 1996.
2. Sharma. S. Pand Chandramohan, *Fuels and Combustion*, Tata McGraw Hill Book Co., 1984.
3. Samir Sarker, *Fuels and Combustion*, Orient Longman, 1984.
4. Kuo. K. K., *Principles of Combustion*, John Wiley & Sons, 1984.
5. Heywood. J. B., *Internal Combustion Engine Fundamentals*, McGraw Hill Book Co., 1988.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering

Branch: Automobile Engineering
Subject: Vehicle Design Characteristics
Total Theory Periods: 40
Class Tests: 2 (minimum)
ESE duration: 3 hours

Semster: VIII
Code: 382844(82)
Total Tutorial Periods: 10
Assignments: 2 (minimum)
Minimum marks: 28

Maximum Marks: 80

UNIT – I

Introduction:

Study and selection of vehicle specifications - Choice of Cycle, fuel, speed, cylinder arrangement, number of cylinders, method of cooling, material, design variables and operating variables affecting performance and emission.

UNIT – II

Performance curves :

Residence, Power and torque curve, Driving force against vehicle speed – Acceleration and gradability in different gears for a typical car or truck plotted from specifications.

UNIT – III

Resistance to vehicle motion:

Calculation and plotting the curves of air, rolling and gradient resistances, driving force – Engine power, speed, rear axle ratio, Torque and mechanical efficiency at different vehicle speeds.

UNIT – IV

Engine design:

Pressure volume diagram, frictional mean effective pressure, engine capacity, calculation of bore and stroke length, velocity and acceleration, gas force, inertia and resultant force at various crank angles – Side thrust on cylinder walls.

UNIT – V

Gear ratios:

Determination of Gear Ratios, Acceleration and gradability - typical problems.

TEXT BOOKS

1. Lichty "IC Engines", Kogakusha Co., Ltd. Tokyo, 1991.
2. Giri. N.K. "Automobile Mechanics" Khanna Publishers, New Delhi, 2002.

REFERENCE BOOKS:

1. Heldt P.M "High Speed Combustion Engine" Oxford & IBH Publishing Co., Calcutta, 1989.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering

Branch: Automobile Engineering

Subject: Soft Computing Techniques

Total Theory Periods: 40

Class Tests:2(minimum)

ESE duration: 3 hours

Semster: VIII

Code: 337845(37)

Total Tutorial Periods: 10

Assignments: 2(minimum)

Minimum marks: 28

Maximum Marks: 80

UNIT – I

Introduction - Introduction to soft computing; introduction to biological and artificial neuralnetwork, introduction to fuzzy sets and fizzy logic systems.

UNIT – II

Artificial neural networks and applications - Different artificial neural network models, learning inartificial neural networks, neural network applications in control systems.

UNIT – III

Fuzzy systems and applications - Fuzzy sets; fuzzy reasoning, fuzzy inference systems, fuzzycontrol, fuzzy clustering, applications of fuzzy systems.

UNIT – IV

Neuro-fuzzy systems - Neuro-fuzzy modeling, Neuro-fuzzy control.Genetic Algorithms- Simple GA, crossover and mutation, genetic algorithms in search and optimization.

UNIT – V

Applications- Pattern Recognitions, Image Processing, Biological Sequence Alignment and DrugDesign, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Analysis languageprocessing.

TEXT BOOKS

1. Fuzzy Logic And Soft Computing – Chen, Guoging, Ving, Mingsheng&Cai, Kai Yuan Ed –Kluwar AcademicPublications,U.S.A
2. Soft Computing and Intelligent Systems Design Theory Tools and Applications – Karray F O &DesilvaC – Pearson, New Delhi

REFERENCE BOOKS

1. A Computational intelligence: principles, techniques, and applications –Konar– Springer.
2. Introduction to pattern recognition: statistical, structural, neural, and fuzzy logic approaches: Friedman, M&Kandel, A. - World Scientific.
3. Neuro-fuzzy and soft computing: a computational approach to learning and machine intelligence - Jang, J SR, Sun, C T, &Mizutani E - Prentice Hall.
4. An introduction to genetic algorithms- Mitchell M - MIT press.
5. Fuzzy Logic with Engineering Applications - Ross T J - John Wiley & Sons

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the program: Bachelor of Engineering

Branch: Automobile Engineering

Subject: Fuel Cell Technology

Total Theory Periods: 40

Class Tests: 2 (minimum)

ESE duration: 3 hours

Semster: VIII

Code: 382846(82)

Total Tutorial Periods: 10

Assignments: 2 (minimum)

Minimum marks: 28

Maximum Marks: 80

UNIT – I

INTRODUCTION AND THERMODYNAMICS

Introduction: Basic operating principles – Historical highlights – Classification. **Thermodynamics:** Electrochemical energy conversion – Theoretical efficiency – Electrochemical energy conversion – Factors affecting electrochemical energy conversion

UNIT – II

ELECTRODE KINETICS

Electrode double layer – Electrolyte double layer – Double layer models (Helmoltz model, Gouy-Chapman Model, Stern model, Grahame model – Bockris, Devenathan and Muller model, and chemical models) – Solid metallic electrode – Semiconductor electrode – Specific adsorption – Zero potential.

UNIT – III

ALKALINE FUEL CELLS & PHOSPHORIC ACID FUEL CELLS

Alkaline Fuel Cells: Working principle – Components – Modules and stacks – Performance characteristics (power density, space applications, atmospheric pressure cells) – Limitations and R&D challenges – System issues – Ammonia as fuel. **Phosphoric Acid Fuel Cells:** Cell reactions – Electrodes (stability of catalysts, electrode fabrication – fuel cell performance) – Stacks and systems.

UNIT – IV

SOLID OXIDE FUEL CELLS & MOLTEN CARBONATE FUEL CELLS

Solid Oxide Fuel Cell: Principle of operation - Benefits and limitations – Cell components (electrolytes, zirconia systems, ceria based electrolytes, perovskite-based systems) – Cathode materials – Anode materials – Interconnects – Fuel reactions – Configurations and performance (tubular, monolithic, planar) – Environmental impact – Applications.

Molten Carbonate Fuel Cell: General principle – Components (electrolyte and matrix, cathode and anode materials) – Electrode reactions – Life time

UNIT – V

DIRECT METHANOL FUEL CELLS & PROTON EXCHANGE MEMBRANE FUEL CELLS

Direct Methanol Fuel Cells: Operating principle – Noble metal issue – Electro-oxidation of methanol (catalysts, oxygen electro-reduction, electrolyte, non-catalytic aspects) - Methanol crossover – Catalyst optimization – Vapor feed versus liquid feed cells.

Proton Exchange Membrane Fuel Cells: Operating principle (membranes, electrodes and electrolysis, optimization of membrane and electrode assembly, impurities) – Technology development (single cell and stacks, composite plates) – Fuel processing – Modeling studies (membrane, electrode, membrane-electrode assembly, fuel cell, stack and system) – Technology development and applications.

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1. Viswanathan, B. and AuliceScibioh, M., *Fuel Cells Principles and Applications*, Universities Press (India) Pvt. Ltd., Hyderabad, 2006.
2. Hoogers, G., Edr., *Fuel Cell Technology Handbook*, CRC Press, Washington D. C., 2003.

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1. Larminie, J. and Dicks, A., *Fuel Cell Systems Explained*, John Wiley & Sons, Ltd., New York, 2001.