KALINGA UNIVERSITY

RAIPUR | INDIA

SCHEME & SYLLABUS FOR

Bachelor of Vocational Studies (B. Voc.) Automobile

NAAC GRADE B+ Accredited University

nirf RANKING 2024 Ranked in Top 151-200 Universities

Kalinga University, Naya Raipur, Chhattisgarh

KALINGA UNIVERSITY
RAIPUR INDIA

BACHELOR OF VOCATIONAL STUDIES (B. VOC.) (AUTOMOBILE)

Semester I							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**External Marks**	**Total Marks**
BVAM101	Communication Skills	3	0	3	30	70	100
BVAM102	Fundamentals of Information Technology	3	0	3	30	70	100
BVAM103	Elements of Automobile	3	0	3	30	70	100
BVAM104	Technical Drawing	3	0	3	30	70	100
BVAM105P	**Industrial /on Job Training (OJT)/ Workshop on any Two**	0	36	18	50	150	200
	AutoCAD Designing						
	CAM						
	Catia software						
	3D Designing						
	Solid						
	Automation						
	Coding of Machine						
	CNC Operations						
	CNC Programmer						
	Fundamental of Electrical Vehicles in 2/3/4 wheeler						
	EV in Maintenance						
	EV in Charging Station						
	EV in Battery maintenance						
	Fundamental of Painting technology						
	Fundamental of Commercial Vehicle						
	Draftsman						
	Fundamental of tool Designer						
	Fundamental of vehicle in 2/3/4 commercial vehicle						
	Total	**12**	**36**	**30**	**170**	**430**	**600**

Semester-II							
Subject Code	**Subject**	**L**	**T/P**	**Credits**	**Internal Marks**	**External Marks**	**Total**
BVAM201	EV Concept and Ecosystem	3	0	3	30	70	100
BVAM202	Environmental Studies	3	0	3	30	70	100
BVAM203	Materials for Automobile	3	0	3	30	70	100
BVAM204	Internal Combustion Engines	3	0	3	30	70	100
BVAM205P	**Industrial Training/ On Job Training/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester-III							
Subject Code	**Subject**	**L**	**T/P**	**Credits**	**Internal Marks**	**External Marks**	**Total**
BVAM301	Transmission Systems	3	0	3	30	70	100
BVAM302	Two & Three Wheeled Automobiles	3	0	3	30	70	100
BVAM303	Suspension and Damping Systems	3	0	3	30	70	100
-	**Elective Any One**	3	0	3	30	70	100
BVAM304A	Non Commercial Vehicles						
BVAM304B	Commercial Vehicles						
BVAM305P	**Industrial Training/ On Job Training/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester-IV							
Subject Code	**Subject**	**L**	**T/P**	**Credits**	**Internal Marks**	**External Marks**	**Total**
BVAM401	Engine Management Principles	3	0	3	30	70	100
	Elective-I Any One	3	0	3	30	70	100
BVAM402A	Instruments and Equipment						
BVAM402B	Automotive Component Design						
	Elective-II Any One	3	0	3	30	70	100
BVAM403A	Automotive Air Conditioning System						
BVAM403B	Automotive Pollution and Control						
	Elective-III Any One	3	0	3	30	70	100
BVAM404A	Motor Vehicle Acts and Loss Assessment						
BVAM404B	Tyre Technology						
BVAM405P	**Industrial Training/ On Job Training/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester-V							
Subject Code	**Subject**	**L**	**T/P**	**Credits**	**Internal Marks**	**External Marks**	**Total**
BVAM501	Electrical & Electronic Systems	3	0	3	30	70	100
BVAM502	Basics of Body Building and Repair	3	0	3	30	70	100
-	**Elective-I Any One**	3	0	3	30	70	100
BVAM503A	Corrosion and Prevention						
BVAM503B	Performance Evaluation in Automobile Workshop						
-	**Elective-II Any One**	3	0	3	30	70	100
BVAM504A	Automotive System Design						
BVAM504B	Off-road Vehicles						
BVAM505P	**Industrial Training/ On Job Training/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester-VI							
Subject Code	**Subject**	**L**	**T/P**	**Credits**	**Internal Marks**	**External Marks**	**Total**
BVAM601	Automobile Servicing	3	0	3	30	70	100
BVAM602	Traction and Driving Systems	3	0	3	30	70	100
BVAM603	Work Shop Supervising and Management	3	0	3	30	70	100
BVAM604P	Major Project	3	0	3	30	70	100
BVAM605P	**Industrial Training/ On Job Training/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

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COMMUNICATION SKILLS
BVAM101

Course Objective

The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Course Outcome:

1. The purpose of this course is to introduce students to the theory, fundamentals and tools of communication
2. To develop vital communication skills which should be integral to personal, social and professional interactions.
3. One of the critical links between human beings.
4. An important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal.
5. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

CONTENTS

Unit I: Introduction:

Theory of Communication, Types and modes of Communication, Mediums and channels of communication, barriers to communication, English as a Global language, the Lingua Franca, Social influences on English

Unit II: Language of Communication:

Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication, Varieties of English, Language, Accent, Dialect, Colloquialism, Historical influences on English

Unit III: Speaking Skills:

Monologue Dialogue Group Discussion Effective Communication/ Mis- Communication Interview Public Speech, Regional influences on English, Convergence and divergence, Linguistic Imperialism,

Unit IV: Reading and Understanding-

Close Reading, Reading analysis of a text - Audience and purpose, Content and theme, Tone and Mood, stylistic devices, structure Comprehension- Analysis and Interpretation Translation(from Indian language to English and vice-versa) Literary/Knowledge Texts

Unit V: Writing Skills

Documenting Report Writing Making notes Letter writing, Writing tabloids, diary entry, open letters, essays, newsletter and magazine articles, skits, short stories, impersonating characters.

It will enhance Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, notetaking etc. While, to an extent, the art of communication is natural to all living beings, intoday's world of complexities, it has also acquired some elements of science. It is hoped that after studying this course, students will find a difference in their personal and professional interactions.

Recommended Readings:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, DrRanjanaKaul, DrBrati Biswas

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FUNDAMENTALS OF INFORMATION TECHNOLOGY

BVAM102

Unit-I

Computer characteristics: Speed, storage, accuracy, diligence; Digital signals, Binary System, ASCII; Historic Evolution of Computers; Classification of computers: Microcomputer, Minicomputer, mainframes, Supercomputers; Personal computers: Desktop, Laptops, Palmtop, Tablet; Hardware & Software; Von Neumann model.

Unit-II

Hardware: CPU, Memory, Input devices, output devices. Memory units: RAM (SDRAM, DDR RAM, RDRAM etc. feature wise comparison only); ROM-different types: Flash memory; Auxiliary storage: Magnetic devices, Optical Devices; Floppy, Hard disk, Memory stick, CD, DVD, CD/DVD-Writer; Input devices - keyboard, mouse, scanner, speech input devices, digital camera, Touch screen Voice Input, Joystick, Optical readers, bar code reader; Output devices: Display device, size and resolution; CRT, LCD, LED; Printers: Dot-matrix, Inkjet, Laser; Plotters, Sound cards & speaker.

Unit-III

Software: System software, Application software; concepts of files and folders, Introduction to Operating systems, Different types of operating systems: single user, multitasking, time-sharing multi-user; Booting, POST; Basic features of two GUI operating systems: Windows & Linux (Basic desk top management); Programming Languages, Compiler, Interpreter, Databases; Application software: Generic Features of Word processors, Spread sheets and Presentation software; Generic Introduction to Latex for scientific typesetting; Utilities and their use; Computer Viruses & Protection, Free software, open source.

Unit-IV

Computer Networks and Internet: Connecting computers, Requirements for a network: Server, Workstation, switch, router, network operating systems; Internet: brief history, World Wide Web, Websites, URL, browsers, search engines, search tips; Internet connections: ISP, Dial-up, cable modem, WLL, DSL, leased line Wireless and Wi-Fi connectivity ; email, email software features (send receive, filter, attach, forward, copy, blind copy); characteristics of web-based systems, Web pages, Web Programming Languages.

Unit-V

Information Technology And Society: Indian IT Act, Intellectual Property Rights, issues. Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel management, Education, Video games, Telephone exchanges, Mobile phones, Information kiosks, special effects in Movies.

Programming Concepts & Techniques: Program Concept, Characteristics of Programme, Stages in Program Development, Tips for Program Designing, Programming Aids, Algorithms, Pseudo code, Notations, Design, Flowcharts, Symbols, Rules, compiler & Interpreter. Introduction to programming techniques, Top-down & Bottom-up approach, Unstructured, & Modular programming, Cohesion, Coupling, Debugging, Syntax & Logical Errors, Linking and Loading, Testing and Debugging, Documentation.

Reference Books:

1. Programming in C, R.S. Salaria, Khanna Publishing House
2. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing House
3. Handbook of Computer Fundamentals, N.S. Gill, Khanna Publishing House

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ELEMENTS OF AUTOMOBILE

BVAM103

UNIT-I:

Introduction: Classification of automobiles- according to number of wheels, propulsion systems, transmission drives, type of fuels, application & capacity, study of main specifications. Components of automobile- functions & layout of frame, frameless construction, axles, steering system, suspension system, braking system, power train & drives, clutch, gear box, final drive, propeller shaft, u-joints, vehicle body, wheels, tyres& tubes.

UNIT-II:

Power Unit: Selection of engine for two wheelers, three wheeler & four wheeler vehicles; constructional & working details of two strokes & four stoke petrol & diesel engines, fuel system, ignition system, starting system, charging system, lighting system, cooling system, lubrication system, combustion &combustion chambers.

UNIT-III:

Steering System and Suspension System: Steering system- requirements, front axle details & steering geometry, castor, camber, toe-in, toe-out steering axis inclination, steering linkages, and different types of steering gear boxes, their constructional & working details. Concept and working of power steering. Need, types 0-]\ of suspension systems, constructional details, characteristics of laminated, coil springs. Introduction to independent suspension, front & rear suspension systems of the vehicle, shock absorbers.

UNIT-IV:

Wheels, Tyres& Braking System: Wheel requirements, types of wheels, their constructional & working details, rims &tyres,types of tyres, tyre selection, ordinary, radial tyres tubeless tyres, their constructional details, comparison & application, wheel balancing. Need and classification of brakes, drum brakes and disc brakes, constructional & working details, introduction to hydraulic brake, parking brake, vacuum assisted hydraulic brakes, air assisted hydraulic brakes, air brakes, leading & trailing brake shoes, self energizing brakes & ABS, working of master cylinder, wheel cylinders, tandem master cylinder, characteristics of brakefluid.

Text Books:

1. K.K. Ramalingam, “Automobile Engineering”, Scitech Publication, Chennai
2. Tom Denton, “Automobile Mechanical and Electrical Systems” Indian Ed., Routledge (T&F Group) Pub
3. P.L. Kohli, “Automotive Chassis & Body”, Tata McGraw Hill, New Delhi

Reference Books:

1. Newton Steeds and Garrot “Motor Vehicles”, Butterworths, London.
2. Judge A.W, “Mechanism of the Car”, Chapman and Halls Ltd., London.
3. Crouse W.H, “Automotive Chassis and Body”, Mcgraw –Hill, New York.
4. K.K. Jain, R.B. Asthana, “Automobile Engineering”, Tata McGraw Hill, New Delhi
5. Dr. Kirpal Singh, “Automobile Engineering (Vol-1)”, Standard Publisher Distributors.

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TECHNICAL DRAWING

BVAM104

Objectives:
The course is aimed at developing basic graphic skills to enable them to draw basic automotive components and to learn about the intricacies of dimension and designs The emphasis while imparting instruction should be to develop conceptual skills in the students

Learning outcomes:
After successful completion of this course, the students should be able to:
The students should be able to read automobile engineering drawings and student should be in a position to understand the intricacies of the component design.

UNIT I

INTRODUCTION

Scales – Recommended scales, reduced & enlarged Drawing Sheet size: A0, A1, A2, A3, A4, A5, Layout of drawing Sheet, sizes of title block and its contents. Using drawing instruments to draw straight lines, rectangles, squares, circles, polygons.

UNIT II

JOINTS PULLEYS & ENGINE BEARINGS

Universal Joint, Slip Joint, Stepped or Cone Pulley, V-Belt Pulley, Bush Bearing, Split Bearing, Thrust Bearing, Ball Bearing, Roller Bearing, Straight and Needle

UNIT III

FREEHAND SKETCHING OF ENGINE COMPONENTS

Sparkplug – Cylinder block - Crankshaft – Piston – Fuel Injector - Common rail fuel injection system - Electronic fuel injection system - Connecting rod – Petrol engine – diesel engine.

UNIT IV

FREEH AND SKETCHING OF TRANSMISSION UNITS

Clutch– Single Plate Clutch – Multi plate clutch – gearbox- universal joint- propeller shaft - differential

UNIT V

FREE HAND SKETCHING OF COOLING SYSTEM AND BRAKING SYSTEM

Cooling System - Lubrication system – braking system – Hydraulic –Pneumatic – suspension unit - leaf spring.

References:

1. R B Gupta; -Automobile Engineering Drawing‖, SatyaPrkashan, New Delhi
2. P. S. Gill; -Machine Drawing‖ B D Kataria and Sons, Ludhiana

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INDUSTRIAL /ON JOB TRAINING (OJT)/ WORKSHOP ON ANY TWO

BVAM105P

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SEMESTER – II

EV CONCEPT AND ECOSYSTEM

BVAM201

Course Objective:
The course is a beginner-level course designed to introduce students to Electric vehicles and give them a brief idea about electric vehicles, and its importance. This course gives some basic technical foundations regarding electric vehicles In-order to help them move on to advanced electric vehicle courses.

Prerequisites:
- Students should have access to a computer with minimum requirements (Pentium 4, Windows 7, 2 GB RAM, 5 GB Hard Disk Space) and a stable Internet connection.

Course Outline:
Unit 1: Introduction to Electric Vehicles
This module introduces the students to the relevance of electric vehicles, current demand in EV industry and opportunities of skilled EV engineers.

Unit 2: Electric Vehicle Foundations
In this module, students will learn the history and evolution of electric vehicles and what goes into building them. Students will be able to appreciate the actual impact of EVs in the world.

Unit 3: Understanding the Foundations of an Electric Vehicle
Here we look into what is considered as an electric vehicle, and what electric vehicles are made up of. This module will cover the necessary components of an electric vehicle.

Unit 4: Mathematical Modeling of an electric vehicle
In this module, students learn about modelling the conversion of an ICE vehicle to electric. They choose a target vehicle in the Indian market, finalize the vehicle specifications and simulate the energy consumption for their electric vehicle conversion using SCILAB.

Text/Reference Books:
1. This course does not require students to use physical textbooks. Instead, original course material (videos, text and images) has been prepared for students to go ELECTRIC VEHICLES:A CREDIT POINTCOURSE
2. through and is open-sourced underCreative Commons Attribution-ShareAlike 4.0International License© Micelio Mobility Pvt.Ltd.

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ENVIRONMENTAL STUDIES

BVAM202

Unit 1 : Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem:

food chains, food webs and ecological succession. Case studies of the following ecosystems :

a) Forest ecosystem

b) Grassland ecosystem

c) Desert ecosystem

d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 2 : Natural Resources : Renewable and Non--renewable Resources

- Land resources and landuse change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water : Use and over--exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter--state).
- Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit 3 : Biodiversity and Conservation

- Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega--biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity : Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions; Conservation of biodiversity : In--situ and Ex--situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 4 : Environmental Pollution

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management : Control measures of urban and industrial waste.
- Pollution case studies.

Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit 5 : Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management : floods, earthquake, cyclones and landslides.
- Environmental movements : Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Suggested Readings:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999.Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll.Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36--37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams(pp. 29--64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

9. Odum, E.P., Odum, H.T. & Andrews, J. 1971.Fundamentals of Ecology. Philadelphia: Saunders.

10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.

11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.

12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012.Environment. 8th edition. John Wiley & Sons.

13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.

14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.

15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.

16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.

17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.

18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.

19. Wilson, E. O. 2006.The Creation: An appeal to save life on earth. New York: Norton.

20. World Commission on Environment and Development. 1987.Our Common Future. Oxford University Press.

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MATERIALS FOR AUTOMOBILE

BVAM203

UNIT-I:

Advanced Materials: Composites – non metallic and metallic. Other specialty materials used in Automotive design and manufacturing. Role of Nano technology in automotive systems.

UNIT-II:

Composite Materials: Mechanics, Manufacturing and Design. Composite materials, including naturally occurring substances such as wood and bone, and engineered materials from concrete to carbon-fiber reinforcedepoxies.Developmentofmicromechanicalmodelsforavarietyofconstitutivelaws.Linkbetween processing and as-manufactured properties through coupled fluid and structural analyses.

UNIT-III:

Smart Materials and Structures: Theoretical aspects of smart materials, sensors and actuator technologies. It will also cover design, modeling and manufacturing issues Page 49 of 73 involved in integrating smart materials and components with control capabilities to engineering smart structures.

UNIT-IV:

Laser Materials Processing: Application of lasers in materials processing and manufacturing. Laser principles and optics. Fundamental concepts of laser/material interaction. Laser welding, cutting, surface modification, forming, and rapid prototyping. Modeling of processes, microstructure and mechanical properties of processed materials. Transport phenomena. Process monitoring.

Text Books:

1. Kenneth G. Budinski, Budinshi; “Engineering Materials: Properties and Selection”, 7th Edition, Pearson Singapore (Prentice Hall)

Reference Books:

1. Donald R. Askeland, Pradeep P. Phule; “Essentials of Material Science and Engineering”,Thomson.
2. A. P. Gupta, “Polymer Composites”, M.C.Gupta; New Age Publication.

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INTERNAL COMBUSTION ENGINES

BVAM204

Unit-1

Operation fundamentals

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

Unit–II

Engine systems

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

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

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.

Text Books:

1. A Course in I.C. Engine - Mathur&Sharma ,Dhanpat Rai & Sons, Delhi, 1994
2. Internal Combustion Engines-V Ganesan, Tata McGraw Hill, Delhi, 602

Reference Books:

1. Fundamentals of I.C. Engines - J.B.Heywood, McGraw Hill International Edition
2. I.C. Engine – Maleev & Litchy, McGraw Hill
3. Modern Petrol Engine - A.W.Judge, B.I. Publications. 1983
4. Automobile Engineering – Anil Chhikara, Satya Prakashan, Delhi
5. I.C Engines and Air Pollution by Obert.

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INDUSTRIAL TRAINING/ ON JOB TRAINING/ WORKSHOP

BVAM205P

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SEMESTER –III

TRANSMISSION SYSTEMS

BVAM301

UNIT-I

Transmission requirements: requirements of transmission system, general arrangement of power transmission, general arrangement of rear-engine vehicle with live axles, general arrangement of dead- axle and axles transmission; four-wheel-drive transmission.

UNIT-II

Clutches Requirements of clutches, principle of friction clutches, types of clutches and materials used-cone, single plate, diaphragm-spring, multi-plate, centrifugal, over-running and electromagnetic clutch.

Gear box: Need of gear boxes, types- sliding mesh, constant mesh and epicyclical, gear boxes; synchronizers: principle, early and later Warner synchronizer, Vauxhall synchronizer- gear materials lubrication and design of gear box; Hydrodynamic drive: Advantages and limitations, principle of fluid coupling, constructional details, torque capacity performance characteristics, drag torque, methods of minimizing drag torque; Torque converter: performance characteristics; single, multistage and poly phase torque converters, converter-coupling-performance characteristics, coupling-blade angle and fluid flow, converter fluid.

UNIT-IV

Transmissionsystems-Driveline: Definition,forces&torquesacting;typesofdrives-Hotchkiss,torque tube & radius rod drives; components- propeller shaft, slip joint, universal joints & constant velocity universal joints; front wheel drive; Final drive: definition; types- worm- wheel, straight-bevel gear, spiral-bevel gear & hypoid-gear drives; double-reduction & twin- speed final drives; Differential: Function, principle, construction and working; non-slip differential; differential lock; rear axle- loads acting & types; multi-axle vehicles.

References Books:

1 Heldt P.M.; Torque converters; Chilton Book Co.
2 Giri NK; Automobile Engineering; Khanna Publisher.
3. Newton, Steeds & Garret; Motor Vehicles; B.H. Publication.
4. Judge, A.W., Modern Transmission Systems, Chapman & Hall Ltd.
5. Check Chart; Automatic Transmission; Harper & Row Publication.

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TWO & THREE WHEELED AUTOMOBILES

BVAM302

Objectives:

- Present a problem oriented in depth knowledge of two and three wheeler technology.
- Address the underlying concepts and methods behind two and three wheeler technology.

Learning outcomes: After successful completion of this course, the students should be able to:

- To present a problem oriented in depth knowledge of two and three wheeler technology.
- To address the underlying concepts and methods behind two and three wheeler technology.

UNIT I POWER UNIT

Two stroke and four stroke SI engine, merits and demerits. Symmetrical and unsymmetrical port timing diagrams. Types of scavenging processes merits and demerits, scavenging efficiency. Scavenging pumps. Rotary valve engine.

UNIT II FUEL AND IGNITION SYSTEMS

Fuel system – Different circuits in two wheeler fuel systems, fuel injection system. Lubrication system, Ignition systems - Magneto coil and battery coil spark ignition system, Electronic ignition System, Starting system - Kick starter system – Self-starter system, recent technologies.

UNIT III CHASSIS AND SUB-SYSTEMS

Mainframe, its types. Chassis and shaft drive. Single, multiple plates and centrifugal clutches. Gear box and gear controls. Front and rear suspension- systems. Shock absorbers. Panel meters and controls on handle bar.

UNIT IV BRAKE AND WHEELS

Drum brakes, Disc brakes, front and rear brake links layouts. Spoked wheel, Cast wheel. Disc wheel. Disc types. Tyres & tubes.

UNIT V TWO & THREE WHEELERS – CASE STUDY

Case study of Sports bike, Motor cycles, Scooters and Mopeds - Auto rickshaws, Pick up van, Delivery van and Trailer, Servicing and maintenance, recent developments**.**

References:

1. Irving. P.E., Motor cycle Engineering, Temple Press Book, London, 1992
2. The Cycle Motor Manual, Temple Press Ltd., London, 1990.
3. Encyclopedia of Motorcycling, 20 volumes, Marshall Cavensih, New York and London, 1989. 4. Bryaut. R.V., Vespa Maintenance and Repair series.
4. Raymond Broad, Lambretta – A practical guide to maintenance and repair, 1987

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SUSPENSION AND DAMPING SYSTEMS

BVAM303

Unit I

Automotive chassis: Definition; chassis layout; types of chassis layout with reference to power plant location, steering position and drive on wheels; chassis components; chassis classification; Automotive frames: Construction; functions; load sacting; materials; types; frame cross sections; frame diagnosis and service; dimensions of wheel base; wheel track; chassis overhang and ground clearance.

Unit II

Front axle & steering system: Functions, construction & types of front axle; front wheel geometry; front wheel drive; steering mechanisms; steering linkages & layout; types of steering gear boxes; power & power assisted steering; electronic steering; four-wheel steering; terminology-reversible steering, under- steering, over-steering, turning radius.

Unit III

Suspension system: Need; factors influencing ride comfort; types; suspension springs-leaf spring, coil spring & torsion bar; spring materials; independent suspension; rubber suspension; pneumatic suspension; hydraulic suspension, shock absorbers-liquid & gas filled.

Unit IV

Wheel: Forces acting on wheels, construction of wheel assembly, types- spoke, disc & built-up wheels; wheel

balancing; wheel alignment; Tyres: Static & rolling properties of tyres, construction details, types of tyres-pneumatic & hydraulic; types of tyre-wear & their causes; tyre rotation. Bearings: Functions; classification of bearings; bearing materials; automotive bearings.

Reference Books:

1. Automobile engineering", Dr. KripalSingh.
2. Automobile engineering" K.M.Gupta.
3. Heldt P.M., "Automotive chassis", Chilton Co., NewYork.
4. Giles J.G., "Steering, Suspension and tyres", Iliffe Book Co.,London.

KALINGA UNIVERSITY
RAIPUR|INDIA

NON COMMERCIAL VEHICLES

BVAM304A

UNIT-I:

The Power Unit

Two stroke and four stroke SI & CI engine Construction and Working, merit sand demerit, Symmetrical and unsymmetrical valve & port timing diagrams, scavenging process

UNIT-II:

Fuel and Ignition Systems

Fuel system – Different circuits in two wheeler fuel systems, fuel injection system. Lubrication system, Ignition systems - Magneto coil and battery coil spark ignition system, Electronic ignition System, Starting system - Kick starter system – Self-starter system, recent technologies

UNIT-III:

Chassis and Sub-Systems

Main frame for non-commercial vehicles, its types, Chassis and different drive systems for two wheelers, Single, multiple plates and centrifugal clutches, Gear box and its and various gear control sin two wheelers,Frontandrearsuspensionsystems,Shockabsorbers,Panelmetersandcontrolsonhandlebar, Free wheeling devices

UNIT-IV:

Brakes and Wheels

Drum brakes & Disc brakes Construction and Working and itsTypes, Front and Rear brake links layouts. Brake actuation mechanism, Spoked wheel, cast wheel, Disc wheel & its merits and demerits, Tyres and tubes Construction & its Types, Steering geometry

Test Books:

1. Two and three wheeler Technology, Dhruv u. Panchal

KALINGA UNIVERSITY
RAIPUR INDIA

COMMERCIAL VEHICLES

BVAM304B

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 takeoff-dr awbarworking,workingofhydraulicliftsystem,workingprincipleofautomaticdraft sensing and control system

UNIT-II

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

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.

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.

Text Books:-

1. Tractor and Automobiles, Rodichev and G.Rodicheva, Mir Publishers, 1987
2. Latest Development of Heavy Earth Moving Machinery, De, Annapurna Publishers, Dhanbad 1995

Reference Books:-

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

KALINGA UNIVERSITY
RAIPUR | INDIA

INDUSTRIAL TRAINING/ ON JOB TRAINING/ WORKSHOP

BVAM305P

KALINGA UNIVERSITY
RAIPUR INDIA

SEMESTER –IV

ENGINE MANAGEMENT PRINCIPLES

BVAM401

Unit I

ME-SFI voltage supply function, ME-SFI fuel ignition and injection system function, To measure the output voltage & to observe the output wave for mofa crank shaft sensor, To measure the output voltage & to observe the output wave form of a camshaft sensor, ME-SFI engine speed signal function.

Unit II

Synchronizing fuel injection and firing order function, ME-SFI fuel supply function, ME-SFI fuel pump actuation function, ME-SFI consumption signal function, ME-SFI fuel reserve signal function, ME-SFI cam shaft adjustment function, ME-SFI electronic adjustment function, ME-SFI idle speed control function, ME-SFI throttle valve damping function, ME-SFI O2 sensor control function, ME-SFI oxygen sensor heating function.

Unit III

Study of principle of working, application, location and effect of sensors- Cam shaft sensor, Crankshaft position sensor, coolant temperature sensor, air temperature sensor, HFM sensor, charge pressure sensor, accelerator pedal sensor, oil sensor. CDI ignition On function. CDI Turbo charging function.

Unit IV

CDI Fuel supply function.CDI Main injection function. CDI Intel shut off part function. CDI Pre-glow function. CDI Start-up glowing and after- glowing function. CDI EGR function. CDI emission control function.CDI starting function.CDI idle speed/driving mode function.CDI start quantity control function. CDI Idle speed control function. CDI quantity control function. CDI anti jerk control function. CDI limiting full load injection quantity function.

Reference Books:

1. Gasoline Engine Management Bosch
2. Diesel Engine Management Bosch

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INSTRUMENTS AND EQUIPMENT

BVAM402A

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

UNIT II

Servicing Equipment: Garage, service station, tune-up, specification and application of-aircompressor, 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

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

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.

Text Books:

1. Garage Equipment-- R K Chauhan, Ishan Publications.
2. Engineering metrology and instrumentation, R K Rajput, S K Kataria and Sons Publication

Reference Books:

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

KALINGA UNIVERSITY
RAIPUR INDIA

AUTOMOTIVE COMPONENT DESIGN

BVAM402B

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.

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.

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.

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.

Text Books:

1. Automobile Design and Drawing - R.B.Gupta, Satya Prakashan
2. Design of Machine Elements- V. B. Bhandari, McGraw Hill Publication
3. Machine Design- Pandya & Shah, Charotar Publishing.

Reference Books:

1. Mechanical Engineering Design- J. E. Shigley, McGraw Hill Publication
2. Design of machine elements- Sharma &Purohit, Prentice Hall India Pub.
3. Machine Design-An Integrated Approach- Robert L. Norton, Pearson Education.
4. Fundamentals of Machine Elements- Hawrock & Jacobson, McGraw Hill Publication

KALINGA UNIVERSITY
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AUTOMOTIVE AIR CONDITIONING SYSTEM

BVAM403A

Objective:

- To the end of the course, the students will be able to understand the components of the automotive air-conditioning and their functions and the latest developments in this field.

Learning Outcomes: After successful completion of this course, the students should be able to:

- At the end of the course, the students will be able to understand the components of the automotive air-conditioning and their functions and the latest developments in this field.

UNIT I AIR-CONDITIONING 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, automatically controlled air conditioner and heater systems, automatic temperature control, air conditioning protection, engine protection.

UNIT III REFRIGERANT

Containers handling refrigerants, tapping into the refrigerant container, refrigeration system diagnosis, diagnostic procedure, ambient conditions affecting system pressures.

UNIT IV AIR ROUTING AND TEMPERATURE CONTROL

Objectives, evaporator airflow through the recirculating unit, automatic temperature control, duct system, controlling flow, vacuum reserve, testing the air control and handling systems.

UNIT V AIR CONDITIONING SERVICE

Air conditioner maintenance and service, servicing heater system removing and replacing components, trouble shooting of air controlling system, compressor service.

References:

1. Mitchell information Services, Inc - —Mitchell Automatic Heating and Air
2. Conditioning Systems‖ - Prentice Hall Ind. - 1989.
3. Paul Weiser - —Automotive Air Conditioning‖ - Reston Publishing Co., Inc., - 1990.
4. MacDonald, K.I., - —Automotive Air Conditioning‖ - Theodore Audel series – 1978.

KALINGA UNIVERSITY
RAIPUR INDIA

AUTOMOTIVE POLLUTION AND CONTROL

BVAM403B

Objectives:

•To make the students to realize the impact of automobile emissions on the environment and expose student to factors affecting the formation and control of automobile pollutants.

Learning Outcome: After successful completion of this course, the students should be able to:

- Familiarize the norms of pollution standards
- Analyze the sources of pollution from automobiles
- Understand the pollution control methods and apply.

UNIT I VEHICLE POLLUTION

Introduction: Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution.

UNIT II SI ENGINE POLLUTION

Pollutant Formation in Si Engines: Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two stroke SI engines, NOx formation in SI engines, effects of design and operating variables on emission formation, control of evaporative emission. Two stroke engine pollution.

UNIT III CI ENGINE POLLUTION

Pollutant Formation in CI Engines: Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions. Nox formation an.d control.-Noise pollution from automobiles, measurement and standards.

UNIT IV EMISSION CONTROL

Control of Emissions from SI and CI Engines: Design of engine, optimum selection of operating variables for control of emissions, EGR, Thermal reactors, secondary air injection, catalytic converters, catalysts, fuel modifications, fiiel cells, Two stroke engine pollution control.

UNIT V POLLUTION TEST METHODS

Measurement Techniques Emission Standards And Test Procedure: Orsat Apparatus, NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles - USA, Japan, Euro and India. Test procedures - ECE, FTP Tests. SHED Test - chassis dynamometers, dilution tunnels.

References:

1. Paul Degobert, Automobiles and Pollution, SAE International ISBN-1-56091-563-3, 1991.
2. Ganesan, V- Internal Combustion Engines- Tata McGraw-Hill Co - 2003.
3. SAE Transactions-Vehicle Emission - 1982 (3 volumes).
4. Obert.E.F.- Internal Combustion Engines, 1988.
5. Marco Nute- Emissions from two stroke engines, SAE Publication-1998.

KALINGA UNIVERSITY
RAIPUR INDIA

MOTOR VEHICLE ACTS AND LOSS ASSESSMENT

BVAM404A

Learning Outcomes: After successful completion of this course, the students should be able to:

- Paraphrase Motor Vehicle Acts.
- Examining of Motor Vehicles for Safety and Pollution Control Engineering.
- Analyzing the Penalties related with the Offences and their Procedures.
- Recognize the types of Motor Vehicle Insurance.
- Extrapolate the Duties and Responsibilities of Surveyor and Loss Assessor.

UNIT I INTRODUCTION TO TRANSPORTATION AND TRANSPORT AUTHORITIES Functions of Transport Authorities. Key terms used in Motor Vehicle Act. Classification and anatomy of different classes of vehicle. 1d. Importance of Permit. Provisions regarding permit. Special Provisions for State Transport Undertakings (STUs).

UNIT II OFFENCES AND PENALTY PROCEDURES FOR TRAFFIC CONTROL.

Manipulate the maximum limits for speed and weight. Reconstructing provisions for vehicles with left-handed driving vehicles. Planning the rules for driving motor vehicle keeping safety of passengers and occupants at public places. Outlining the punishments for law-breakings.

UNIT III VEHICLE INSURANCE

History of Insurance. Types of motor vehicle insurance. Types of motor vehicle policies. Zero Depreciation Policy. Terms and Conditions for motor vehicle insurance.

UNIT IV ANALYZING VEHICLE IMPACT

Reasons of occurring of accidents. Effect on vehicle during impact from: i. Any One Side. ii. Head on Collision. iii. Vehicle Topple.

UNIT V SURVEYING AND INVESTIGATING MOTOR VEHICLE CLAIM. Roles of Surveyor and loss assessor. Licensing and controlling authorities for surveyors and loss assessors. Claim procedure. Assessing losses in case of accident.

References:

1. Gujarat Motor Vehicle Rules, 1989 Gujarat State Government Government of Gujarat
2. Insurance Claims Solution Dr. L. P. Gupta Dr. L. P. Gupta
3. Central Motor vehicle Act, 1989 Central Government of India Government of India
4. Motor Vehicle Accident Reconstruction and Cause Analysis Rudolf Limpert Lexis Nexis Publications
5. Motor Vehicle Laws (Acts and Regulations) Universal's Legal Manual Universal Law Publishing Co. Pvt. Ltd.

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TYRE TECHNOLOGY

BVAM404B

Objectives:

- To understand various components used and their function of tyres.
- To know the building & curing of tyres.

Learning Outcomes: After successful completion of this course, the students should be able to:

- Understand various components used and their function of tyres.
- Know the building & curing of tyres.

UNIT I INTRODUCTION TO BASICS OF TYRES

Types of tyres, tyre components and its role, tread patterns, outline of production of tires, Requirements and function of tyres - Major departments of a Tyre Industry – An explanation of their function and relation to other departments.

UNIT II FABRIC PREPARATION

Fabrics of the Tyre Industry: Cotton, Rayon, Nylon & steel cords – manufacture, construction – styles and presentations. Bonding methods – Fabric bonding necessities of stronger fabrics leading to bonding methods developments. Wet & dry bonding systems - dip and hot stretch process for Nylon. Recent developments in Radical Tyre fabrics.

UNIT III TYRE BUILDING

Tyre building inputs: Inner liners, plies, beads, tread, side wall and gum strips – their inspection Drum inspection for drumset, drum circumference Significance of parameters for tyre building. Size making on finished tyre and the relation to building specifications. Intermitant consolidation use of various cements and gum strips.

UNIT IV MOULD DESIGN Rib, lug, combination, contact area, deflection, tread wear, mileage, TWI, abradability, Elastic wear and Plastic wear, aqua planing.

UNIT V GREEN TYRE PREPARATION & CURING

Internal and External painting – Awling – Bagging in case of Air bag cure Bag-o- matic and Air bag curing – mold lubrication- Bladder assembly bead curing rings – Dimension criticality Services to the Bag-o-matic presses Curing cycle – shaping – HPS, and hot water circulation. Dome steam cold water & vacuum cycles. Determination of optimum cure of tyres by thermocouple built tyres.

References:

1. Automobile Tyres, L J K Setright, Chapman and Hall, 1972.

2. Tyre Technology, Tom French, Adam Hilger, 1989.

3. Maurice Morton, —Rubber Technology‖, Springer, 3rd edition, 1987.

4. Claude Hepburn, —Rubber Technology and Manufacture‖, Third Edition, 2005. 5. Kovac. F. J, — Tyre Technology‖, Good Year Tire & Rubber Company, 1973.

5. Different tyre manufacturer‘s websites.

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INDUSTRIAL TRAINING/ ON JOB TRAINING/ WORKSHOP

BVAM405P

KALINGA UNIVERSITY
RAIPUR INDIA

SEMESTER –V

ELECTRICAL & ELECTRONIC SYSTEMS

BVAM501

UNIT-I:

Fundamentals of DC & AC Circuits: Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Mesh analysis, Nodal analysis, Ideal sources –equivalent resistor, current division, voltage division. Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phase or representation, Introduction to three phase systems - types of connections, relationship between line and phase values. Introduction to magnetic circuits- Simple Magnetic Circuits-Faraday's laws, induced emf and inductances.

UNIT-II:

Electrical Machines & Measuring Instruments: Working principle, construction and applications of DC machines and AC machines, transformers, single phase induction motors: split phase, capacitor start and capacitor start & run motors. Basic principles and classification of instruments - Moving coil and moving iron instruments.

UNIT-III:

Electronic Components & Semiconductor Devices: Resistors, capacitors & inductors (properties, common types, I-V relationship and uses), Overview of Semiconductors - basic principle, operation and characteristics of PN diode, Zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell)

UNIT-IV:

Transducers & Digital Electronics: Instrumentation – general aspects, classification of transducers, basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers – piezoelectric and thermocouple.

Number systems: binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

Text Books:

1. Dash S.S, Subramani C, Vijayakumar K, "Basic Electrical Engineering", First Edition, Vijay Nicole Imprints Pvt. Ltd
2. Thyagarajan T, SendurChelvi K.P, Rangaswamy T.R, "Basic Electronics Engineering", Third Edition New Age International,
3. Somanathan Nair B, Deepa S.R, "Basic Electronics", I.K. International Pvt. Ltd.

Reference Books:

1. Smarajt Ghosh, “Fundamentals of Electrical & Electronics Engineering”, Second Edition, PHI Learning
2. Metha V.K, RohitMetha, “Basic Electrical Engineering”, Fifth Edition, S. Chand & Co
3. Kothari D. P. and Nagrath I. J., “Basic Electrical Engineering”, Second Edition, Tata McGraw-Hill
4. Bhattacharya S. K, “Basic Electrical and Electronics Engineering”, First Edition, Pearson Education.
5. Thomas L. Floyd, “Electronic Devices”, Ninth Edition, Pearson Education.
6. Rajput R.K, “Basic Electrical and Electronics Engineering”, First Edition, Laxmi Publications.

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BASICS OF BODY BUILDING AND REPAIR

BVAM502

Objectives:

At the end of the course, the students will be able to have a sound knowledge for the design of the vehicles body to give maximum comfort for the passengers and exposed to the methods of stream lining the vehicles body to minimize drug.

Learning Outcomes: After successful completion of this course, the students should be able to:

- Understand the car body and commercial used in automobile.
- Understand the body material used in automobile systems.
- Learn the vehicle aerodynamics

UNIT I CAR AND BUS BODY DETAILS

Types of Car body and Bus body. Types of body constructions-Conventional and Integral body construction. Car body & Bus body construction – Construction regulations for bus body – Layout dimensions.

UNIT II COMMERCIAL VEHICLE BODY AND TYRE

Different types of commercial vehicle bodies. Constructional details of platform body, Tipper body and Tanker body. Dimension of driver's seat in relation to controls. Drivers cab design.

UNIT III BODY MATERIALS AND TRIM

Steel sheet, Aluminum, Timber, Plastics, GRP and PRP. Corrosion and Anti corrosion methods. Body panel tools for repairing, tinkering and soldering. Surface finish: Painting processes – Electroplating of components, Vacuum coating and Electrostatic painting. Body trim items.

UNIT IV VEHICLE AERODYNAMICS Objectives- Vehicle drag and types, various types of forces & moments and their effect. Various body optimization techniques for minimum drag. Wind tunnel testing - Flow visualization techniques, scale model testing.

UNIT V BODY REPAIR Integral body - frame – design features of an integral body frame – safety body cell – off road vehicles – accident damage and diagnosis – before repair decisions – body repair spares. Repair procedures – minor damage vehicle repairs – repairs with washer welder – repairs with hammer and dolly – panel filling with plastic body fillers and putties – body aligning – panel replacement – outer door panel replacement – rust repairs – surface rust repairs – repair of severely rusted panels. Corrosion protection.

References:

1. Powloski J, Vehicle Body Engineering, Business Books Ltd, 1989.
2. Giles G.J. Body Construction & Design Illiffe Books Butter worth & co., 1971
3. John Fenton Vehicle Body Layout and Analysis, Mechanical Engineering Publication Ltd., London, 1980. 4. Body repair Techniques, Anil Chhikara, Satya Prakashan, New Delhi – Vol IV.

KALINGA UNIVERSITY
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CORROSION AND PREVENTION

BVAM503A

Learning Outcomes: After successful completion of this course, the students should be able to:

- Students gain adequate about the electrochemical nature of corrosion of metals and alloys.
- Students obtain a basic understanding of multifarious painting materials and their comparison cost.
- Students know how to slow or defeat corrosion by using various anti-rust methods.
- Students understand the basic knowledge of painting material and use of latest techniques like spray gun in the Automobile parts.
- Students become familiar with basic methods of paint preparation and colour matching and their use in automotive bodies

UNIT-I Corrosion, consequences of corrosion, chemistry of corrosion, factors affecting corrosion that control the corrosion rate, types of corrosion, corrosion prevention-conditioning the metal.

UNIT II conditioning the corrosive environment, electrochemical control, Anti Rust coatings, Painting Materials- acrylic lacquer, acrylic enamel, urethane enamel, synthetic enamel, comparison of cost.

UNIT-III Preventive Techniquies- Types of Primer, primer surfaces, primers, sealer, metallic, thinners and reducers, putty, wax polish and grease remover scrubbing compound, determining type of old finish.

UNIT IV Preparing paint and matching colours- colour identification, preparing the paint, colour matching, matching colour with spray gun.

UNIT V Spray painting equipment- spray gun- details, selection of air gap, fluid tip, fluid needle adjustment, care of spray gun, air for painting, hose size, pressure drop, spray booth. Different methods to remove paints, removing paint with disk grinder, paint removal, Prepare surface for paint, paint drying equipment. Using a spray gun, air pressure, spraying temperature, Paint defects.

References:

1. A.K. Khanna, Metallic Corrosion: Principles and Control Hardcover – 2007, New Age InternationalPublishers
2. Baldevraj, Corrosion Prevention and Control, Alpha Science International Publishers
3. S. Sastri, Corrosion prevention and protection, John Wiley &Sons,Ltd
4. Denny A. Jones, Principles and prevention of corrosion,Pearson Education Ltd, 2013

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RAIPUR INDIA

PERFORMANCE EVALUATION IN AUTOMOBILE WORKSHOP BVAM503B

Objectives:

- This course provides knowledge about purpose of performance evaluation and methods for performance appraisal. It helps to locate extract and organise all the evaluations in performance of each unit.

Learning Outcomes:

- Studying evaluation and its components.
- Implementation of performance modeling
- Learning basic assessment techniques.
- Understanding methods of performance appraisal
- How to follow customer satisfaction standards

UNIT I Evaluation- definition and types, Purpose of performance evaluation, evaluation components i.e. elements, objectives and responsibilities, basic assessment techniques, design and implementation.

UNIT II Performance standards, evaluation process/timelines, complaints- definition and types, performance factors and performance planning, performance modeling, customer feedback, customer facilitations and satisfaction measures.

UNIT III Methods for performance appraisal i.e. management by objectives (MBO), critical incident method, 360 degree method, comparative evaluation method, forced distribution method.

UNIT IV Performance indicators, performance appraisal form, employee development, Employee Ratings, different incentives for employees.

References:

1. John Jones, Chris W. Chen, New Supervisor Training (ASTD Trainer's Workshop Series)
2. Elaine Biech, New Supervisor Training, 2015
3. N Khurmi R.S Khurmi, A Textbook of Workshop Technology: Manufacturing Processes Paperback – 1 Dec 2010
4. R.S. Stephenson, Vehicle workshop operations
5. Mitch Schneider, Automotive Service Management: Operations Management 1st Edition
6. Andrew Rezin, Automotive Service Management (2nd Edition) (Automotive Comprehensive Books) 2nd Edition

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AUTOMOTIVE SYSTEM DESIGN

BVAM504A

UNIT I Design of Clutches & Gearbox:

Design requirements of friction clutches, selection criterion, torque transmission capacity, lining materials, Design of single plate clutch, mutilate clutch and centrifugal clutch. Selection of gear ratios and final drive ratio, numerical on 3- speed and 4- speed gearbox.

UNIT II Design of Propeller Shafts and Axles:

Design of propeller shafts for bending, torsion and rigidity, Design of universal joints and slip joints, final drive, Design of live and dead axles.

UNIT III Brake Systems: Design of hydraulic braking system, internal expanding shoe brake and disc brake, design of master and wheel cylinder and piping design.

UNIT IV Design of Suspension and Steering System:

General design considerations of suspension system, design of helical and leaf springs for automobile suspension system, design considerations of Belleville springs, elastomeric springs, design considerations of steering system and vehicle frame design.

UNIT V Statistical Consideration in Design and Optimization:

Ergonomics and aesthetic design, statistics in design, design for natural tolerances, statistical analysis, and mechanical reliability, introduction to design optimization of mechanical elements, adequate and optimum design, methods of optimization, Johnson‘s method of optimum design-simple problems in optimum design like axially loaded members.

Reference Books: 1. Automobile Mechanics, A.K. Babu, S.C.Sharma, T.R. Banga, Khanna Publishing House

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OFF-ROAD VEHICLES

BVAM504B

Objectives:

- At the end of the course, the students will be able to understand the various Off-road vehicle and their systems and features

Learning Outcomes:

- The students will be able to understand the various Off-road vehicle and their systems and features

UNIT I CLASSIFICATION AND REQUIREMENTS OF OFF-ROAD VEHICLES Construction layout, capacity and applications of off-road vehicle - prime mover, chassis and transmission, Multiaxle vehicles.

UNIT II EARTH MOVING CONSTRUCTIONAL MACHINES dumpers - safety features, safe warning system for dumper, Design aspects on dumper body, Articulated Dumpers, loaders - single bucket, Multi bucket and rotary types - bulldozers, kinematics for loader and bulldozers with operational linkages, excavators, backhoe loaders, scrappers, motor graders, power shawl, bush cutters, Bush cutters, stumpers, rippers.

UNIT III INDUSTRIAL APPLICATIONS Constructional and working details of Jib crane, concrete ready mixers, compactors - vibratory compactors, forklift, utility vehicles, man - lift, scissors, lift trucks, material handlers, power generators.

UNIT IV FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES Tractors, classification - working attachments, power take off, special implements, paddy harvester, sugarcane harvester, feller bunchers, special features and constructional details of military tankers, AVLB gun carriers and transport vehicles.

UNIT V VEHICLE SYSTEMS, FEATURES Brake system and actuation – OCDB and dry disc caliper brakes. Body hoist and bucket operational hydraulics. Hydro-pneumatic suspension cylinders. Power steering system. Articulated steering assembly - power and capacity of earth moving machines.

References:

1. Abrosimov. K. Bran berg. A and Katayer. K., “Road making machinery”, MIR Publishers, Moscow, 1971.
2. Nakra C.P., —Farm machines and equipments‖ Dhanparai Publishing company Pvt. Ltd.
3. Robert L Peurifoy, —Construction, planning, equipment and methods‖ Tata McGraw Hill Publishing company Ltd.
4. SAE Handbook Vol. III., Society of Automotive Engineers, 1997 5. Wong. J. T., “Theory of Ground Vehicles‖, John Wiley & Sons, New York, 1987.

KALINGA UNIVERSITY
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INDUSTRIAL TRAINING/ ON JOB TRAINING/ WORKSHOP

BVAM505P

KALINGA UNIVERSITY
RAIPUR INDIA

SEMESTER –VI

AUTOMOBILE SERVICING

BVAM601

UNIT-I

Importance of maintenance, types- preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedules. Safety precautions in maintenance. Knowledge of free and paid service schedules, fault diagnosis, job cards, warranty procedures, log sheets and other forms.

UNIT-II

Lubrication system – lubricating/ engine oil top up, oil changing, cleaning methods, visual and dimensional inspections, minor/major adjustments of various components, maintenance of engine accessories- air filter, battery, cooling system, electrical wiring in engine compartment. Engine tune up, top overhauling, dismantling of engine components, cleaning, visual and dimensional inspections, minor/major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance/ overhauling, Servicing and maintenance of cooling systems, lubrication system.

UNIT-III

Maintenance of other assemblies: lubrication system – lubricating/ gear oil top up, oil changing, cleaning methods, visual and dimensional inspections, minor/major adjustments of various components of transmission system, Servicing and maintenance of clutch, gear box, propeller shaft, differential. Servicing and maintenance of suspension system, brake system, steering system, wheel alignment and wheel balancing.

UNIT-IV

Electrical System Maintenance

Checking of electrical components for functioning, checking of battery, electrolyte top up, terminal cleaning&protectionmethods,checkingofstartermotor,checkingofchargingsystems-fanbelttension checking and adjustment, Testing methods for checking of ignitions system, lighting system, fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

Text Books:

1. K.K. Ramalingam, “Automobile Engineering”, Scitech Publication, Chennai
2. S Srinivasan, “Automotive Mechanics”, Tata McGraw Hill, New Delhi
3. Tom Denton, “Automobile Mechanical and Electrical Systems” Indian Edition, Routledge (Taylor & Francis Group) Publication.

Reference Books:-

1. Newton Steeds and Garrot, “Motor Vehicles”, Butterworths, London.
2. Judge A.W, “Mechanism of the Car”, Chapman and Halls Ltd., London.
3. Crouse W.H, “Automotive Chassis and Body”, McGraw –Hill, New York.
4. K.K. Jain, R.B. Asthana, “Automobile Engineering”, Tata McGraw Hill, New Delhi
5. Dr. Kirpal Singh, “Automobile Engineering” (Vol-1), Standard Publisher Distributors

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TRACTION AND DRIVING SYSTEMS

BVAM602

UNIT I

Study of physics of driving Vehicle Kinematics terms Study in detail the function, task and location of different components of ESP.

UNIT II

Study the function location and task of the lateral acceleration sensor, Study the function of Yaw rate sensor, Input singles to ESP control unit.

UNIT III

Output signals or ESP control unit, Function of ESP if vehicle under steers and over steers during left cornering and during braking in the right side curve, Study of ASR functions: Brake torque control and drive torque control.

UNIT IV

Study of brake booster with BAS, understanding function of BAS. Understanding BAS operating conditions, to study function and task of ABS.

Reference:

1. Car owner manual
2. Workshop Information Systems

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WORK SHOP SUPERVISING AND MANAGEMENT

BVAM603

Objective:

- This course provides knowledge of appropriate use of resources and planning of project. Various automobile marketing techniques are inculcated through various research methodologies.

Learning Outcomes: After completing this course, learners should be able to:

- **To** Study of resources used in automobile firms
- **To** How to follow service schedules for maintenance of automobile.
- **To** Knowledge of job orders in marketing of automobiles
- **To** Solving various assignment problems for assigning job roles
- **To** Understanding guidelines for workshop areas

UNIT I MANAGEMENT TRAINING AND OPERATIONS Basic principles of supervising - Organising time and people - Job instruction training, training for new devices and techniques - Evaluate and allotment of technician – Vehicle operation and types of process - Work scheduling, Overtime, Breakdown analysis, Cost estimation - Vehicle technical specifications of various OEM vehicular products – Relevant and up-to-date knowledge of vehicle design, manufacture, consumer, industry and trade practices - Importance of maintenance, types- preventive (scheduled) and breakdown (unscheduled) maintenance - Safety precautions in maintenance- Knowledge of free and paid service schedules, fault diagnosis, technician notes, job cards, warranty procedures, log sheets and other forms- Evaluate the information gathered from the customer report, customer satisfaction.

UNIT II ENGINE MAINTENANCE Lubrication system - lubricating/ engine oil top up, oil changing, cleaning methods, visual and dimensional inspections, minor/major adjustments of various components - maintenance of engine accessories- air filter, battery, cooling system, electrical wiring in engine compartment. Engine tune up, top overhauling, dismantling of engine - components, cleaning, visual and dimensional inspections, minor/major reconditioning of various components, reconditioning methods, engine assembly - special tools used for maintenance/ overhauling.

UNIT III MAINTENANCE OF OTHER ASSEMBLIES LUBRICATION SYSTEM lubricating/ gear oil top up, oil changing, cleaning methods - visual and dimensional inspections, minor/major adjustments of various components of transmission system - Servicing and maintenance of clutch, gear box, propeller shaft, differential - Servicing and maintenance of suspension system, brake system, steering system, wheel alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE Checking of electrical components for functioning, checking of battery, electrolyte - top up, terminal cleaning & protection methods, checking of starter motor, checking of charging systems- fan belt tension checking and adjustment - Testing methods for checking of ignitions system, lighting system - fault diagnosis and maintenance of modern electronic controls - checking and servicing of dash board instruments.

UNIT V MOTOR VEHICLE ACT AND POLLUTION CONTROL AND STANDARDS Motor Vehicle Act:

Schedules and sections, Registration of motor vehicles, Licensing of drivers, Control of permit, Limits of speed, traffic signs - Constructional regulations - Description of goods carrier, delivery van, tanker, tipper, Municipal - fire fighting and break down service vehicle. **Pollution:** Pollutant formation in Engines, mechanism of HC and CO formation in four stroke and two stroke engines, NOx formation in engines - Engine Design modifications, fuel modification, evaporative emission control - EGR, air injection, thermal reactors, Water Injection, catalytic converters - Application of microprocessor in emission control- Pollution standards, driving cycles – Indian Pollution standards.

References:

1. Tim Gills, —Automotive Service: Inspection, Maintenance, Repairing‖, Cengage Learning, 2004
2. Kirpal Singh, —Automobile Engineering‖, Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.

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MAJOR PROJECT

BVAM604P

On the basis of learning in the Bachelor of Vocational, a project to be taken up by the student strengthening his/ her vocational skills

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INDUSTRIAL TRAINING/

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