KALINGA UNIVERSITY

RAIPUR | INDIA

SCHEME OF EXAMINATION & SYLLABUS

For
Bachelor of Vocational Studies (B.Voc)
(Engine Testing)

NAAC GRADE B++ Accredited University

nirf RANKING 2022 Ranked in Top 101-150 Universities

Kalinga University, Naya Raipur, Chhattisgarh

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B.VOC IN ENGINE TESTING

B.Voc in Engine Testing 1st Semester							
Subject Code	**Subject**	**L**	**T / P**	**Credits**	**Internal Marks**	**External Marks**	**Total**
BVET101	Engineering Science	3	0	3	30	70	100
BVET102	IT Tools	3	0	3	30	70	100
BVET103	Manufacturing Technology - I	4	0	4	30	70	100
BVET104	English	2	0	2	30	70	100
BVET105P	Mechanical Workshop Practice - I	0	3	1.5	20	30	50
BVET106P	IT Tools Lab	0	3	1.5	20	30	50
-	**On-Job-Training –Any One**	0	30	15	50	150	200
BVET107A(P)	Automotive Service Technician						
BVET107B(P)	Auto Body Technician						
BVET107C(P)	AC Specialist						
BVET107D(P)	Accessory Fitter						
BVET107E(P)	Lathe Operator						
	Total	**12**	**36**	**30**	**210**	**490**	**700**

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B.Voc in Engine Testing
2nd Semester

Subject Code	Subject	L	T / P	Credits	Internal Marks	External Marks	Total
BVET201	Environmental Science	2	0	2	30	70	100
BVET202	Automobile Electrical Equipment	3	0	3	30	70	100
BVET203	Two and Three Wheeler	3	0	3	30	70	100
BVET204	Motor Vehicle Technology-I	4	0	4	30	70	100
BVET205P	Language Lab	0	3	1.5	20	30	50
BVET206P	Mechanical Workshop Practice - II	0	3	1.5	20	30	50
-	**On-Job-Training –Any One**	0	30	15	50	150	200
BVET207A(P)	Automotive Service Technician						
BVET207B(P)	Auto Body Technician						
BVET207C(P)	AC Specialist						
BVET207D(P)	Accessory Fitter						
BVET207E(P)	Lathe Operator						
	Total	**12**	**36**	**30**	**210**	**490**	**700**

B.Voc in Engine Testing
3rd Semester

Subject Code	Subject	L	T / P	Credits	Internal Marks	External Marks	Total
BVET301	Motor Vehicle Technology -II	3	0	3	30	70	100
BVET302	Automotive NVH - I	3	0	3	30	70	100
BVET303	Automobile Maintenance Service & Repairs -I	3	0	3	30	70	100
BVET304	Modern Electric& Hybrid Vehicles	3	0	3	30	70	100
BVET305P	Electric & Hybrid Vehicles Lab	0	2	1	20	30	50
BVET306P	Project	0	4	2	50	100	150
-	**On-Job-Training –Any One**	0	30	15	50	150	200
BVET307A(P)	Automotive Service Technician						
BVET307B(P)	Spare Parts Operations Executive						
BVET307C(P)	Industrial Engineer						
BVET307D(P)	Tool Designer						
BVET307E(P)	Equipment Designer						
	Total	**12**	**36**	**30**	**240**	**560**	**800**

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B.Voc in Engine Testing
4th Semester

Subject Code	Subject	L	T / P	Credits	Internal Marks	External Marks	Total
BVET401	Alternative Fuel & Emission Control	3	0	3	30	70	100
BVET402	Automotive NVH - II	3	0	3	30	70	100
BVET403	Automobile Maintenance Service & Repairs - II	3	0	3	30	70	100
BVET404	Garage Organization & Transport Management	3	0	3	30	70	100
BVET405P	Project	0	6	3	50	100	150
-	**On-Job-Training –Any One**	0	30	15	50	150	200
BVET406A(P)	Automotive Service Technician						
BVET406B(P)	Spare Parts Operations Executive						
BVET406C(P)	Industrial Engineer						
BVET406D(P)	Tool Designer						
BVET406E(P)	Equipment Designer						
	Total	**12**	**36**	**30**	**220**	**530**	**750**

B.Voc in Engine Testing
5th Semester

Subject Code	Subject	L	T / P	Credits	Internal Marks	External Marks	Total
BVET501	Automobile Electrical System	3	0	3	30	70	100
BVET502	Automobile Drawing & Design	3	0	3	30	70	100
BVET503	Automobile Engine Systems	3	0	3	30	70	100
BVET504	Auto Body Repair, Denting & Painting	3	0	3	30	70	100
BVET505P	Automobile Workshop - I	0	3	1.5	20	30	50
BVET506P	Auto Body Repair, Denting & Painting Workshop	0	3	1.5	20	30	50
-	**On-Job-Training –Any One**	0	30	15	50	150	200
BVET507A(P)	Automotive Service Technician						
BVET507B(P)	Automation Specialist						
BVET507C(P)	Assembly Line Machine Setter						
BVET507D(P)	Process Design Engineer						
BVET507E(P)	Quality Controller						
	Total	**12**	**36**	**30**	**210**	**490**	**700**

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B.Voc in Engine Testing
6th Semester

Subject Code	Subject	L	T / P	Credits	Internal Marks	External Marks	Total
BVET601	Automobile Engine Systems	3	0	3	30	70	100
BVET602	Automotive Refrigeration and Air Conditioning	3	0	3	30	70	100
BVET603	Vehicle Performance and Testing	3	0	3	30	70	100
BVET604	Electrical & Hybrid Vehicles – II	3	0	3	30	70	100
BVET605P	Automotive RAC Lab	0	3	1.5	20	30	50
BVET606P	Vehicle Performance and Testing Lab	0	3	1.5	20	30	50
-	**On-Job-Training –Any One**	0	30	15	50	150	200
BVET607A(P)	Automotive Service Technician						
BVET607B(P)	Automation Specialist						
BVET607C(P)	Assembly Line Machine Setter						
BVET607D(P)	Process Design Engineer						
BVET607E(P)	Quality Controller						
	Total	**12**	**36**	**30**	**210**	**490**	**700**

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(SEMESTER-I)
ENGINEERING SCIENCE
(BVET101)

Unit-I Soldering and Brazing

General characteristics of soldering, brazing joints, processes and their characteristics, brief description of soldering and brazing tools equipment, types of solders and fluxes and their uses, soldering defects and their remedies, brazing materials, advantages and disadvantages of soldering and brazing. Introduction to PCB, PCB designing, wet etching, dry etching, track correction, wiring, single sided and double sided PCB.

Unit-II Measuring Instruments

Construction and working principles of moving iron and moving coil voltmeters and ammeters, dynamometer type wattmeter, ohm meter, megger and induction type energy meter- their circuit connection and application for measurement of electrical quantities.

Unit-III Electrical Engineering Drawing

Schematic and wiring diagram for domestic simple wiring, symbols used for different electrical devices and equipments.

Unit-IV Electrical wiring

Types of wiring – cleat wiring, casing and capping, C.T.S./T.R.S. wiring, metal sheath wiring, conduit wiring and concealed wiring – their procedure. Factors of selection of a particular wiring system, importance of switch, fuse

Unit-V Earthing

Earthing of wiring system, types of faults, their causes and remedies, Types of earthing- plate earthing and Pipe earthing, their procedure and application. Methods of finding numbers of circuits and circuit distribution by distribution board system loop in system of wiring connections IE rules related to wiring.

Reference Books:

1. Environmental Studies, M.P. Poonia & S.C. Sharma, Khanna Publishing House
2. A Textb ook o f E nviro nmen ta l S cien ces, Rimpi M ehan i Ne ’ Chop ra, Khan na Pub lishing House

IT TOOLS
(BVET102)

Unit-I

Computer Organization & OS: User perspective.

- Understanding of Hardware.
- Basics of Operating System.

Unit-II

- Networking and Internet.
- Network Safety concerns.
- Network Security tools and services.
- Cyber Security.
- Safe practices on Social networking.

Unit-III

Office automation tools:

- Spreadsheet.
- Word processing.
- Presentation.

Unit-IV

Multi Media Design: (Open Source Design Tools).

- Interface and Drawing Tools in GIMP.
- Applying Filters.
- Creating and handling multiple layers.
- Using Stamping and Smudging tools.
- Importing pictures.

Unit-V

Troubleshooting: Hardware, Software and Networking.

- Commonly encountered problems.
- (Monitor: No display, KB/Mouse not responding, monitor giving beeps, printer not responding, check for virus, Delete temporary files if system is slow, adjust mouse speed).
- Work Integrated Learning IT – ISM
- Identification of Work Areas.
- Work Experience.

Reference Books:

1. IT Tools, R.K. Jain, Khanna Publishing House
2. Information Security & Cyber Laws, Sarika Gupta, Khanna Publishing House
3. Mastering PC Hardware & Networking, Ajit Mittal, Khanna Publishing House

MANUFACTURING TECHNOLOGY - I (BVET103)

Unit-I

a. General Introduction: (a) Scope of subject "Workshop Technology" in engineering (b) different shop activities and broad division of the shops on the basis of nature of work done such as (i) Wooden Fabrication-carpentry (ii) Metal Fabrication (shaping and Forming, Smithy, sheet metal and Joining-welding, Riveting, Fitting and Plumbing).

b. Carpentry: (a) Fundamental of wood working operations (b) Common Carpentry Tools- Their classification, size, specification (name of the parts and use only): (i) Marking and measuring tools (ii) Holding and supporting tools: (iii) Cutting and Sawing Tools: (iv) Drilling and Boring Tools (v) Striking Tools-Mallet and Claw hammer (vi) Turning Tools & Equipment (vii) Miscellaneous Tools

Unit-II

a. Joining of Timber Components for Fabrications Works: Assembly of joints (Preparation steps and tools used only) Mortise, Tenon, Rivet, Groove, Tongue, Dowel, operations in assembly-simple lap and butt, Mortise, Tenon, Dovetail, Miter & briddle joints.

Metal Fabrication

b. (Metal Shaping-Smithy: (i) Operations involved (concept only) (ii) Tool and equipment used (Names, size, specification for identification only) (iii) Heating and fuel handling equipment (iv) Holding and supporting tools (v) Striking Tools (vi) Cutting tools (vii) Punching & Drifting Tools (viii) Bending Tools and figures (ix) Forming & Finishing Tools (x)

Defects Occurring & its remedy

Unit-III

Sheet metal working-Tools and operation:

1. Operations involved (Names and concept only)
2. Sheet metal joints
3. Tools and equipment used (Name, size, specifications for identification only)
4. Marking tools
5. Cutting and shearing Tools
6. Straightening tool
7. Striking Tools
8. Holding Tools
9. Supporting Tools
10. Bending tools
11. Punching-Piercing and Drafting tools
12. Burring Tools-Files
13. Defects Occurring & its remedy

Unit-IV

A. Metal Joining During Fabrication-
   a. Permanent Joining: (i) Welding methods (ii) Electric welding
   b. Soldering & Brazing: (i) Its concept, comparison with welding as joining method and classification (ii) Soldering operation (iii) Materials Used (iv) Defects Occurring & its remedy

B. Riveting- (i) Its comparison with welding as joining method. (ii) Rivets and Materials. (iii) Operation involved (iv) Tools and equipment used (Names, Size, specification and uses)), Elementary knowledge about working of pneumatic, hydraulic and electric riveter. Temporary Joining (Fasteners & their uses), General Idea about temporary fasteners & their uses

C. Familiarity with the Use of Various Tools Used in Mechanical Engineering Workshop (a)Marking & Measuring Tools (b) Holding Tools (c) Cutting Tools (d) Files (e) Thread Cutting Tools (h) Miscellaneous Tools

They should be shown physically to each student for familiarity.

Unit-V

A. Protection of Fabricated Structures From Weather:
   a. Painting: Its need, Introduction to methods of painting (classification only) operations involved description steps only, surface preparation materials, tools and equipment used (name, size specification for identification), Brushes-round and flat wire brush, scraper, trowel, spray gun, compressor, Defects likely to occur in painting and their remedies
   b. Varnishing & Polishing: Its need, operation involved (description of steps only), surface preparation method of old and new articles, application of polishing materials, materials used for preparation of french and sprit polish, copal varnish, Defects likely to occur.

Safety of Personnel, Equipment & Tools to be observed

B. Foundry Work:

Elementary idea of patterns, green sand moulds and moulding, tools and equipment used in green sand moulding

Reference Book(s):

1. Workshop Technology, Vol. I: Hazra & Chaudhry
2. Workshop Technology, Vol. I: BS Raghuwanshi
3. Karyashala Takniki: JK Kapoor

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ENGLISH
(BVET104)

Course Outcomes

1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking.
2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.
3. Students will apply it at their work place for writing purposes such as Presentation/official drafting / administrative communication and use it for document/project/report/research paper writing.
4. Students will be made to evaluate the correct & error-free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & also for academic uses.
5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing inter-personal communication skills and positive attitude leading to their professional competence.

Unit-I- Basics of Technical English

Technical English: Definition; Extent& Coverage; Dimensions; Reading; Skimming: Scanning Churning & Assimilation; Writing: Methods: Inductive; Deductive; Exposition; Linear; Interrupted; Spatial & Chronological etc; Technical Communication; Approaches: Brevity; Objectivity; Simplicity; Utility & Clarity.

Listening: Active; Passive; Thinking strategies: Positive & Logical thinking; Speaking: Essentials Nuances & Modes of Speech Delivery.

Unit-II - Components of Technical Writing

Vocabulary Building: Select words; Concept of word formation; Word formation; Root words from foreign languages & their use in English; Prefixes & Suffixes: Derivatives; Synonyms; Antonyms; Abbreviations. Homophones. One word substitutes; Requisites of Sentences.

Unit-III - Basic Technical Writing Skills

Forms: Business writing: Principle; Purchase & Sales Letters; Drafts; Official Writing: Official Letter; D.O. Letter; Notices; Agenda; Minutes of Meeting; Sentence Structure; Phrases & Clauses in sentences; Coherence; Unity; Emphasis in Writing; Devices; Use of Writing methods in Documents; Techniques of writing.

Unit-IV - Common Grammatical Errors & Technical Style

Subject-verb agreement; Correct usage: Noun; Pronoun; Agreement; Modifiers; Articles; Prepositions; Cliches; Redundancies; Technical Style: Features; Choice of words; Sentences: Descriptive; Narrative; Expository; Defining & Classifying; Length of paragraph; Writing of Introduction & Conclusion.

Unit-V- Presentation Strategies & Oral Communications

Analysis of locale; Audience; Modulating Style & Content; Speaking with confidence; Kinesics; Paralinguistic features of Voice-Dynamics: Pitch; Intonation; Stress & Rhythm; Conversation & dialogues; Communication at work-place; etc.

Text Books:

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.

Reference Books:

1. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors, 2009, Delhi.
2. Manual of Practical Communication by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013, Delhi.
3. English Grammar and Usage by R.P.Sinha, Oxford University Press, 2005, New Delhi.

4. English Grammar, Composition and Usage by N.K.Agrawal&F.T.Wood, Macmillan India Ltd., New Delhi.
5. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House
6. English Grammar & Composition by Wren & Martin, S.Chand& Co. Ltd., New Delhi.
7. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt. Ltd, 2011, New Delhi.
8. Personality Development, Harold R. Wallace &L.Ann Masters, Cengage Learning, New Delhi
9. Personality Development & Soft Skills, BarunK.Mitra, Oxford University Press, 2012 New Delhi.
10. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
11. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.
12. Spoken English- A manual of Speech and Phonetics by R.K.Bansal&J.B.Harrison, Orient Blackswan, 2013, New Delhi.
13. Business English by Ken Taylor, Orient Blackswan, 2011, New Delhi.

MECHANICAL WORKSHOP PRACTICE - I (BVET105P)

1. CARPENTRY SHOP WORK:

(EX-1) Planing and sawing practice

(EX-2) Making of lap joint

(EX-3) Making of mortise and tanon joint

2. PAINTING AND POLISHING:

(EX-1) To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and Polish the other side.

(EX-2) To prepare metal surface for painting, apply primer and paint the same.

(EX-3) To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

The sequence of polishing will be as below- (i) Abrasive cutting by leather wheel. (ii) Polishing with hard cotton wheel and with polishing material. (iii) Buffing with cotton wheel or buff wheel.

3. SHEET METAL WORKING AND SOLDERING:

(EX-1) Cutting, shearing and bending of sheet. (EX-2) To prepare a soap case by the metal sheet

(EX-3) To make a funnel with thin sheet and to solder the seam of the same

(EX-4) To make a cylinder and to solder the same

4. FITTING SHOP WORK:

(EX-1) Hack sawing and chipping of M.S. flat

(EX-2) Filing and squaring of chipped M.S. job

(EX-3) Filing on square of rectangular M.S. Plate

5. PLUMBING SHOP WORK:

(EX-1) Cutting and threading practice for using socket, elbow and tee etc and to fit it on wooden practice board.

SMITHY SHOP WORK:

(EX-1) To prepare square angular piece by M.S. rod

(EX-2) To Braze M.S. flat/Tipped tool on M.S. shank

(EX-3) To make a screw driver with metallic handle

6. WELDING SHOP WORK:

(EX-1) Welding practice gas & electric

(EX-2) Welding for lap joint after preparing the edge

(EX-3) Welding Butt joint after preparing the edge

Reference Books:

1. Workshop Technology, Vol. I: Hazra & Chaudhry
2. Spreadsheets, Word, Presentation
3. Multimedia Design
4. Troubleshooting
5. Project / Practical File
6. Viva Voce

IT TOOLS LAB
(BVET106P)
(ON-JOB-TRAINING – ANY ONE)
AUTOMOTIVE SERVICE TECHNICIAN
(BVET107A(P))
AUTO BODY TECHNICIAN
(BVET107B(P))
AC SPECIALIST
(BVET107C(P))
ACCESSORY FITTER
(BVET107D(P))
LATHE OPERATOR
(BVET107E(P))

KALINGA UNIVERSITY
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(SEMESTER-II)
ENGINEERING SCIENCE
(BVET201)

OBJECTIVES:

1. To learn the importance in conservation of environment and natural resources.
2. To learn causes, effects and control measures of environmental pollution.
3. To understand the concepts of disaster management and preparedness to overcome

UNIT – I

General: Environmental segments, environmental degradation, environmental impact assessment. Concept of Ecosystem: Fundamental of Ecology and Ecosystem, components of ecosystem, food-chain, food-web, trophic levels, energy flow, cycling of nutrients, major ecosystem types (forest, grass land and aquatic ecosystem).

UNIT – II

Air Pollution: Atmospheric composition, energy balance, classification of air pollutants, source and effect of pollutants – Primary (CO, SOx, NOx, particulates, hydrocarbons), Secondary [photochemical smog, acid rain, ozone, PAN (Peroxy Acetyl Nitrate)], green house effect, ozone depletion, atmospheric stability and temperature inversion, Techniques used to control gaseous and particulate pollution, ambient air quality standards.

UNIT – III

Water Pollution: Hydrosphere, natural water, classification of water pollutants, trace element contamination of water, sources and effect of water pollution, types of pollutants, determination and significance of D.O., B.O.D., C.O.D. in waste water, Eutrophication, methods and equipment used in waste water treatment preliminary, secondary and tertiary.

UNIT – IV

Land Pollution & Noise Pollution: Lithosphere, pollutants (agricultural, industrial, urban waste, hazardous waste), their origin and effect, collection of solid waste, solid waste management, recycling and reuse of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting). Noise Pollution: Sources, effect, standards and control.

UNIT – V

Environmental Biotechnology: Definition, current status of biotechnology in environmental protection, bio-fuels, bio-fertilize, bio-surfactants, bio-sensor, bio-chips, bio-reactors. Pollution Prevention through Biotechnology: Tannery industry, paper and pulp industry, pesticide industry, food and allied industry.

Text Book(s):

1. Environment and Ecology by Piyush Kant Pandey and Dipti Gupta (Sum India Publication)
2. A Textbook of Environmental Chemistry and Pollution Control by S.S. Dara (S. Chand and Company)

Reference Book(s):

1. Masters, G.M. Introduction to Environment Engineering and Science (Prentice Hall of India).
2. Environmental Chemistry by A.K. Dey (Eastern Ltd.).
3. Environmental Chemistry by B.K. Sharma (Krishna Prakashan).
4. Nebel B.J. Environmental Science (Prentice Hall of India-1987).
5. Environmental Biotechnology by S.N. Jogdand (Himalaya Publishing House).
6. Introduction to Environmental Biotechnology by A.K. Chatterji (Prentice Hall of India).

AUTOMOBILE ELECTRICAL EQUIPMENT (BVET202)

Unit 1: Automobile Wiring Systems & Cables

Earth-return and insulated-return systems; 6 Volt, 12 Volt and 24 Volt systems. Positive and negative earthing. Cables-starting systems cables, general purpose cables and high- tension cables; specifications and colour codes. Diagram of a typical wiring system. Wiring harness, cable connectors, circuit breakers, plastic fibre-optic wires, printed circuits. Fuses in circuits.

Unit 2: Storage Battery

Principle of lead-acid cells; constructional details of battery plates, separator, container, terminal, vent plug, grouping compound. Electrolyte: specific gravity of electrolyte and its variation with temperature. Effect of charging and discharging of specific gravity. Capacity of battery. Efficiency of battery. Methods of charging of battery. Internal circuit of battery charger. Care and maintenance of batteries. Checking for cell voltage and specific gravity of electrolyte. Battery tests- high discharge test, cranking motor test, open-circuit voltage test, cadmium test, life test. Battery failures, Maintenance-free batteries, VRLA batteries, Traction battery. Alkaline type batteries. Fuel cell and its types, Battery Life enhancer.

UNIT 3: Dynamo

Principle of generation of D.C. Constructional details of a Dynamo. Armature reaction. Principle of commutation. Construction of commutator. Types of wound field generator- series, shunt and compound wound. Other types of D.C. generators-four brush & four pole, interpole, split field and bucking field. Dyna-Starter, Generator drive.

UNIT 4: Alternator

Principle of generation of A.C. Constructional details of an alternator. Working of alternators. Advantages over dynamo. Types of alternators. Charging of battery with an alternator. Regulator for alternators.

UNIT 5: Regulators

Constant current and constant voltage systems, Double-contact and compensated voltage- control regulators. Current-and-voltage regulator, Cut-out

Reference Books:

1. Automotive Electricals and Electronics, A.K. Babu, Khanna Publishing House
2. Automotive Electrical Equipment: PL Kohli
3. Modern Electrical Equipment: AW Judge
4. Automotive Electrical Equipment: WH Crouse

TWO AND THREE WHEELER (BVET203)

Unit I: The Power Unit

Two stroke and four stroke SI & CI engine Construction and Working, merits and demerits, 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 two and three wheelers, its types, Chassis and different drive systems for two wheelers, Single, multiple plates and centrifugal clutches, Gear box and its and various gear controls in two wheelers. Front and rear suspension systems, Shock absorbers, Panel

meters and controls on handle bar, Freewheeling devices

Unit IV: Brakes and Wheels

Drum brakes & Disc brakes Construction and Working and its Types, 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

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

MOTOR VEHICLE TECHNOLOGY-I (BVET204)

UNIT1: INTRODUCTION & CHASSIS LAYOUT

General study of the motor vehicle with functions of its main components and assemblies (engine excluded), Development of a Tractor and its basic function and H.P. requirements, Conventional layout of chassis Front wheel drive, four wheel drive, rear engine vehicle, their advantages and disadvantages, Layout of Maruti car chassis and tractor chassis, Definitions of items-wheel track, wheel base, front and rear overhang, kerb weight, ground clearance.

UNIT2: CLUTCH SYSTEM

Layout of conventional transmission system, Maruti car transmission system, Tractor transmission system, clutch - necessity, functions, requirements, types, Constructional details and working of single plate, multiple plate, diaphragm clutches, fluid coupling, Centrifugal and semi-centrifugal clutch, Tractor clutch, Clutch pedal free play. Torque transmitted by clutch. Simple numerical problems. Clutch defects, probable causes, remedies.

UNIT3: GEAR BOX

Function and necessity, Construction and working details of sliding mesh, constant mesh, synchromesh gear boxes; epicyclic gear box - its applications and advantages. Over drive, Torque convertor, Maruti-800 car gear box, tractor gear box and P.T.O. shaft, 4 wheel drive auxiliary gear box. Gear ratio

UNIT4: FINAL DRIVE

Torque tube drive, Hotchkiss drive, Universal joints, constant velocity joints, slip joints, Propeller shaft. Differential, slip differential, double reduction differential, final drive ratio. Tractor final drive construction and working, Rear axles-Fully floating, semi-floating, three quarter floating, Tractor axles

UNIT5: WHEELS AND TYRES

Road-wheels - Rim types and sizes, Tyres-conventional, radial, Tubeless tyre its advantages, Tyre sizes, wheels-front and rear, Tyre retreading, Tyre wear, wheel balancing, Tyre pressure, Advantages of filling nitrogen in tyres.

Reference Books:

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

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LANGUAGE LAB (BVET205P)

Module – 1: Listening and speaking skills

1. In this module the learners will be exposed to a variety of listening activities recorded on audiotapes. These will be samples of good spoken English, which the learner scan uses as models. Work sheets will accompany the listening material. This module will include the following:
2. Introducing yourself/friends in formal and informal situations.
3. Inviting people (over the phone and face to face) giving details of occasion, time place and date. Acceptance and refusal of invitation – formal and informal.
4. Seeking and supplying information (example opening an account in a bank, applying for leanest.)
5. Talking and conveying messages (over the phone and face to face).
6. Giving directions /instruction.
7. Discussing contemporary issues related to environment, child labor, gender bias etc.
8. Listening to excepts form television and radio.
9. Listening to poems/plays (prescribed).
10. Listening to speeches /talks.
11. Listening to songs like “We shall overcome”.

Module – 2 to 4 (English for specific purposes) (opt any one)

These modules are being offered. A learner has to opt for any one. The first is for academic purposes and the next two are for vocational purposes. The focus is not on the teaching of the subject matter like science and literature button the way in which language is used in the deferent subjects.

Module 2: English for Science

This course will introduce learners to some interesting pieces of popular science

1. Health and hygiene
2. Conservation of (nearly extinct) animals.
3. Plant life.
4. Bio gas / solar energy.

These pieces illustrate the use of English in scientific writing: giving information factually, logically and objectively.

Module 3: English for Receptionist

Thismodulewillintroducethelearnerstoavarietyofexercises,tasksandmeaningfulactivities related to the receptionist’s use of English. The printed course materials will be supported by tapes.

The following competencies be developed:

1. Receiving messages, making request etc.
2. Supplying information
3. Giving advice and making suggestions
4. Dealing with complaints
5. Making entries in an appointment book, register etc.

Module 4: English for Office Use

This course will help the learner to use English effectively and appropriately in the office environment.
The competencies will be developed.

1. Using the telephone taking and passing messages.
2. Receiving messages
3. Marking noting on files and circular.
4. Writing office notes, memos, notices, agendas for meetings.
5. Telegrams and fax messages.
6. Writing business letters, application enquires, complaints.
7. Filling in forms, cheques, pay in ship sets.

MECHANICAL WORKSHOP PRACTICE - II (BVET206P)

1. Welding Shop Work

Exp-1: Welding practice-gas and electric

Exp-2: Welding for lap joint after preparing the edge

Exp-3: Welding for Butt joint after preparation of the edge Exp-4: `T' joint welding after preparation of edge.

2. Carpentry

(i) Bridle joint (ii) Dovetail joint (iii) Utility article like picture frame, larger peg, Name plate etc.

3. Fitting

(i) Drill a hole in MS Block & tapping the same (ii) Making a Bolt & Nut by Tap & Die set. (iii) Utility article-screw driver, Paper weight.

4. Smithy

(i) To make square or hexagonal head bolt (ii) To make ring with hook (iii) Utility article-to prepare a fan hook.

5. Tin Smithy, Soldering, Brazing

(i) To prepare different types of joint such as lap joint single seam, double seam & cap joint- hem & wired edge. (ii) Utility article-waste paper basket or paper tray (iii) Study & sketch stakes/ anvils.

Reference Books:

1. Elements of Workshop Technology Vol. I: BS Raghuwanshi

(ON-JOB-TRAINING –ANY ONE)
AUTOMOTIVE SERVICE TECHNICIAN (BVET207A(P))
AUTO BODY TECHNICIAN

KALINGA UNIVERSITY
RAIPUR | INDIA

(BVET207B(P))
AC SPECIALIST
(BVET207C(P))
ACCESSORY FITTER
(BVET207D(P))
LATHE OPERATOR

(BVET207E(P))
(SEMESTER-III)
MOTOR VEHICLE TECHNOLOGY -II
(BVET301)

UNIT 1: FRAME AND BODY

Function and construction of frame. Cross-section of frames. Unitized construction (monocoque) types of bodies. Terms - Turning radius, lock-to-lock angle, centre point steering, positive steering, gradeability. Idea of Safety features in a modern car.

UNIT 2: SUSPENSION SYSTEM

Function. Types - conventional and independent. Spring types - coil, leaf - elliptical, semi- elliptical; helper springs, transverse springs. Spring camber; spring material. Torsion bar, stabiliser bar. Shock absorbers- telescopic and gas. Maruti suspension system and shockers. Anti-roll bars. Nitrox suspension.

UNIT 3: STEERING SYSTEM AND FRONT AXLE

Principle - Ackermann and Davis. Function, requirements. Steering gear box - types. Construction and working details of worm and sector, rack and pinion, worm and wheel, worm and recirculating ball type. Tractor steering. Power steering. Electronic Steering. Front axle - rigid front axle. Stub axle. Elliot and reverse elliot type. Lemoine and reverse lemoine type. Tractor front axle. Maruti steering system. Wheel alignment - castor angle, camber angle, K.P.I., Toe-in, toe out. General values of these.

UNIT 4: BRAKING SYSTEM

Braking terms - braking efficiency, stopping distance, stopping time, weight transfer during braking, leading/trailing shoe of brake. Determination of braking torque. Effect of braking on steering. Types of braking systems- constructional details and working of mechanical brakes, hydraulic brakes, parking brake, vacuum, pneumatic, air-hydraulic brakes; tractor brakes. Drum and disc brakes. Master cylinder, tandem master cylinder, wheel cylinder. Brake lining and brake fluid. Brake defects, their causes and remedies. Anti Lock Braking System (ABS) & Electronic Brake Distribution (EBD).

UNIT 5: AUTOMOBILE POLLUTION AND ITS CONTROL

Effects and extent of pollution caused due to stationary and automobile engines. Harmful products and their causes in petrol & diesel engines. Measures to control exhaust emissions from two-stroke engines, four-stroke engines, and diesel engines. Turbocharger. Products which cause de-activation of catalysts in catalytic converters. Unleaded petrol. Emission measuring instruments for petrol and diesel engines. Limits specified in Motor Vehicles Act. Recent trends in Automobile Pollution Control-Exhaust Gas Recirculation. Air Injection, Reactor System. Positive Crankcase Ventilation. Evaporative Emission Control System.

Reference Books:

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

AUTOMOTIVE NVH - I
(BVET302)

Unit-I: Introduction to NVH: Noise, Vibration and Harshness (NVH) and its role in automotive design and development. Physiological effects of noise and vibration, sources of vibration and noise in automobiles,

Unit II Vibrations

Basic concepts of vibration, time period, frequency, SHM, types of vibration, Natural frequency, resonance, damping, mathematical models.

Unit-III: Vibration Analysis: Formulating the equations of motion - linear and torsional system. Damped and undamped single degree of freedom system, undamped two degree of freedom systems derivation, coordinate coupling, generalized coordinates.

Unit IV Vibration Control

Different types of dampers, vibration absorbers, centrifugal pendulum, dry friction, untuned viscous, vibration isolation

Unit V: Vibration measurement: Instruments, vibrometer, velocity pick-ups, frequency measurement instrument. one applications: isolation of the engine from vehicle structure and control of torsional oscillation amplitudes in engine crankshaft.

AUTOMOBILE MAINTENANCE SERVICE & REPAIRS -I (BVET303)

Unit 1: Workshop Equipment

Equipment for testing electrical accessories: Electric test bench, growler, coil tester, ignition and cam-dwell-angle tester; wiring harness tester. Ampere-hour battery tester, voltmeter tester, Layout of diesel injector and F.I.P. reconditioning shop, Tools and equipment required

Unit 2: Lubrication and Maintenance Schedule

Necessity for routine maintenance, Importance of service manuals, Specification of engines- petrol and diesel vehicles

(a) Engine (b) Clutch (c) Gear Box (d) Propeller shaft (e) Universal joints (f) Differential

(g) Axles and hubs

Unit 3: Lubrication and Maintenance Schedule

(a) Suspension system (b) Steering system (c) Tyre (d) Chassis (e) Brake-drum and disc

(f) Battery (g) Self starter (h) Dynamo

Unit 4: Fuel System

Maintenance Schedule of diesel engine fuel injector, hot plugs, rotary and reciprocating type of fuel injection pump, fuel injection pump of single cylinder engines, hoses & pipe lines, priming unit, tanks. Electricals: Maintenance Schedule of batteries, starter motor, dynamo, ignition system, wiper motor, electrical fuel pump, alternator, horn, flasher unit.

Unit 5: Engine Tuning

(a) Engine tuning of conventional and MPFI petrol engine. Adjustments of spark plug gap, valve tappet clearance, head bolts, Use of vacuum and compression gauge, Air cleaner cleaning, Ignition timing setting by timing light, Pollution checking, Troubleshooting

Reference Books:

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

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MODERN ELECTRIC & HYBRID VEHICLES (BVET304)

Unit 1: Introduction

Introduction to electric and hybrid electric vehicles, History of hybrid and electric vehicles, Social and environmental importance of electric and hybrid electric vehicles, Electrical basics, Motor and generator basics

Unit 2: Electric and Hybrid Electric Drive Trains

Basic concept of electric and hybrid traction, Introduction to various electric and hybrid electric drive train topologies, Advantages and disadvantages

Unit 3: Power Flow

Power flow control in electric and hybrid electric drive train topologies.

Unit4: Electric Drive Components

Introduction to electric drive components used in electric and hybrid vehicles, Electric motor requirements, Direct Current (DC) motors (Brushed and Brushless), Power converters, Drive controllers.

Unit 5: Regenerative Braking System (RBS)

Introduction and need of Regenerative Braking System, Advantages and disadvantages of RBS, Working of RBS, Concept of Regenerative Braking using Piezoelectric material, Using shock absorbers as vibration energy harvesters.

Reference Books:

1. Electric & Hybrid Vehicles, A.K. Babu, Khanna Publishing House
2. Automotive Fuel Technology-Electric, Hybrid and Fuel-Cell Vehicles: Jack Erjavec & Jeff Arias
3. Electric and Hybrid Vehicles: Design Fundamentals: Iqbal Husain
4. Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory and Design: Mehrdadehsani, Yimingao, Ali Emadi

ELECTRIC & HYBRID VEHICLES LAB (BVET305P)

Experiments:-

1. Understand working of different configurations of electric vehicles
2. Understand hybrid vehicle configuration and its components, performance analysis
3. Understand the properties of batteries and its types
4. Understand of electric vehicle drive systems.
5. Understand of hybrid electric vehicles.
6. Understand Auxiliary systems including charging, starter motor, on board power supply, lighting and environmental sensing and conducting repairs. Repair & Replacement of Electric/ Hybrid Vehicle body
7. Repair & Replacement of Electric Vehicle Drive Train
8. Fault diagnosis & repair / replacement of Battery, DC & AC Electrical Machines, Hybrid Electric Vehicles

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PROJECT
(BVET306P)

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

(ON-JOB-TRAINING –ANY ONE)
AUTOMOTIVE SERVICE TECHNICIAN
(BVET307A(P))
SPARE PARTS OPERATIONS EXECUTIVE
(BVET307B(P))
INDUSTRIAL ENGINEER
(BVET307C(P))
TOOL DESIGNER
(BVET307D(P))
EQUIPMENT DESIGNER

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(BVET307E(P))
(SEMESTER-IV)
ALTERNATIVE FUEL & EMISSION CONTROL
(BVET401)

Unit-I: Conventional Fuels and Need for alternative fuels: Estimate of petroleum reserve and availability - comparative properties of fuels- diesel and gasoline, quality rating of SI and CI engine fuels, fuel additives for SI and CI engines, thermodynamics of fuel combustion - introduction to chemical thermodynamics, chemical reaction - fuels and combustion, enthalpy of formation and enthalpy of combustion, first law analysis of reacting systems, adiabatic flame temperature, need for alternative fuels, applications, types etc.

Unit-II: Alternative Fuels: Gaseous Fuels and Bio-fuel: Introduction to CNG, LPG, ethanol, vegetable oils, bio-diesel, biogas, Hydrogen and HCNG. Study of availability, manufacture, properties, storage, handling and dispensing, safety aspects, engine/vehicle modifications required and effects of design parameters performance and durability Synthetic Fuels Introduction to Syngas, DME, P-Series, GTL, BTL, study of production, advantages, disadvantages, need, types, properties, storage and handling, dispensing and safety, discussion on air and water vehicles.

Unit–III: Emission Control (SI Engine): Emission formation in S.I. engines - Hydrocarbons, carbon monoxide, oxides of nitrogen, poly-nuclear aromatic hydrocarbon, effects of design and operating variables on emission formation in spark ignition engines, controlling of pollutant formation in engines exhaust after treatment, charcoal canister control for evaporative emission control, emissions and drivability, positive crank case ventilation system for ubhc emission reduction.

Unit-IV: Emission Measurement and Control (CI Engine):Chemical delay, intermediate compound formation, pollutant formation on incomplete combustion, effect of design and operating variables on pollutant formation, controlling of emissions, emissions and drivability, exhaust gas recirculation, exhaust after treatment – doc, dpf, scr and lnt. Measurement and test procedure (ndir analyzers, fid, chemiluminescence nox analyzer, oxygen analyzer, smoke measurement, constant volume sampling, particulate emission measurement, orsat apparatus.) Unit-V: Health effects of Emissions from Automobiles:Emission effects on health and environment. Emission inventory, ambient air quality monitoring, Emission Norms: As per Bharat Standard up to BS – IV.

Reference Books:

1. 1.Electric & Hybrid Vehicles, A.K. Babu, Khanna Publishing House

AUTOMOTIVE NVH - II
(BVET402)

Unit 1: Noise Fundamentals: Fundamentals of acoustics – general sound propagation – structure borne sound and air borne sound, plane wave propagation - wave equation, specific acoustic impedance, acoustic intensity, spherical wave propagation – acoustic near and far fields, reference quantities, the decibel scale

Unit 2: Sound Analysis:

Anatomy of human ear, mechanism of hearing, loudness, weighting networks, equivalent sound level, relationship among sound power, sound intensity and sound pressure level, summation of pure tones, decibel addition, subtraction and averaging, effects of reflecting surfaces on sound propagation, octave band analysis,

Unit 3: NVH Measurements: Vibration and Noise Standards – Pass/Drive by noise, noise from stationary vehicles, interior noise in vehicles, NVH measurement tools and techniques, Modal parameter (natural frequency, mode shape and damping) estimation techniques, signal and system analysis

Unit 4: Automotive Noise Sources Methods for control of engine noise, transmission noise, intake and exhaust noise, aerodynamic noise, tyre noise, brake noise

Unit 5: Automotive Noise Control Techniques

Noise control strategy, noise control at source – along the path – isolation, damping, balancing, resonators, absorption, barriers and enclosures

AUTOMOBILE MAINTENANCE SERVICE & REPAIRS - II (BVET403)

Unit 1: Fault Diagnosis

Diagnostic Trouble Codes, ECM Power and Ground Circuit Check, MAP Sensor Circuit, VSS Circuit Check, Fuel Pressure Check, Fuel Injection Circuit Check, Evaporative Emission Control system Check, Inspection of ECM & its Control.

Unit 2: Overhaul and Reconditioning Procedures -1

Overhaul and reconditioning procedures of engine, clutch, gear box

Unit 3: Overhaul and Reconditioning Procedures - 2

Propeller shaft & universal joints, differential, axles, and hubs, Overhaul and reconditioning procedures of steering and suspension system components including McPherson strut. Overhaul and reconditioning procedures of drum and disc brakes

Unit 4: Overhaul and Reconditioning Procedures -3

Service, overhaul and testing of starter motor, alternator, ignition system, wiper motor, electrical fuel pump, horn, flasher unit, wiring harness, condenser, H.T. coil, spark plug.

Unit 5: Reconditioning

Overhaul, and testing of diesel fuel injector, single and multi cylinder fuel injection pumps. Calibration, phasing, and spray tests.Air-conditioning and heating equipment: Faults and their remedies.

Reference Books:

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

GARAGE ORGANIZATION & TRANSPORT MANAGEMENT (BVET404)

UNIT 1: LAYOUT OF GARAGE AND TOOLS & EQUIPMENT REQUIRED

Location of modern automobile garage. Layout of a fully equipped modern garage. Major equipment used in repair, testing, and reconditioning of automobiles. Service Station equipment (compressor, washer, hydraulic ramp and other lifting devices etc.) Denting and painting tools and equipment. Layout of fuel filling station-cum-service station. Workshop safety.

UNIT 2: GARAGE PROCEDURE

A typical garage organisation chart. Duties of garage foreman. Vehicle selling- dealership, showroom, Terms of Warranty, after-sales service, advertising, and salesmanship. Diagnosing and estimating repairs. Booking of repairs. Job card, time card. Inspection and testing of repaired vehicles. Billing of repairs. Customer record. Purchase and sale of used vehicles. Insurance and accidental jobs. Safety in garages. Customer satisfaction. Time management.

UNIT 3: STORE ORGANISATION

Stores and store-keeping procedure. Day book, ledger, stock register. Indenting and issue of spares and materials. Inventory control. Stocking of material - shelves, racks, bins; fuels and inflammable materials. Handling of liquids and acids. Duties and responsibilities of store- keeper and purchase officer. Tools-Storing and issuing.

UNIT 4: FLEET MANAGEMENT

Types of vehicles in a fleet - goods vehicles, tankers and carriers, delivery vans, fire fighting vehicles, break-down service vehicles, buses and luxury vehicles. Layout of a fleet maintenance depot, Duties of driver, conductor and mechanic, Scheduling the maintenance of a fleet. Estimating the operating cost of transport vehicles

UNIT 5: MOTOR VEHICLE ACT

Definition of vehicles, testing and certifying procedures, Registration of vehicles, Permits for passenger and goods vehicles, Licensing, Transfer of ownership. Essentials of driving and traffic regulations; signals and traffic signs

Reference Books:

1. Fleet Maintenance & Management: AW Clair

PROJECT (BVET405P)

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

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(ON-JOB-TRAINING –ANY ONE)
AUTOMOTIVE SERVICE TECHNICIAN
(BVET406A(P))
SPARE PARTS OPERATIONS EXECUTIVE
(BVET406B(P))
INDUSTRIAL ENGINEER
(BVET406C(P))
TOOL DESIGNER
(BVET406D(P))
EQUIPMENT DESIGNER
(BVET406E(P))

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(SEMESTER-V)
AUTOMOBILE ELECTRICAL SYSTEM
(BVET501)

UNIT 1: STARTING SYSTEM

Principle, construction and working of starter motor. Series motor and its characteristics, Compound wound motor, Engine starting circuit, Starter drives-Bendix (torsion, compression), over-running clutch and sliding armature types. Starter switch - manual, solenoid, Factors affecting the starting of engines, Torque terms. Starting torque and power required, Motor efficiency, Armature reaction, Typical motor specifications

UNIT 2: IGNITION SYSTEM OF SPARK-IGNITED ENGINES

Types of ignition systems- battery-and-coil, magneto ignition systems. Ignition circuit. Details of the ignition system-ignition coil, distributor, condenser, contact breaker points, rotor, distributor cap, distributor drive. Firing order. Ignition timing. Ignition advance and retard, need, and factors it depends upon. Methods for obtaining advance and retard- vacuum and mechanical. Optical sensor for spark timing.

UNIT 3

Spark plugs-constructional details; types used in automobiles, conditions of working of spark plugs. Glow plugs of diesel engines. Magneto-rotating armature and rotating magnet types. Electronic ignition of cars & motor-cycles (CDI), Idea of Distributor-less Direct ignition system.

UNIT 4: LIGHTING SYSTEM

Requirements of automobile lighting. Head lamp - mounting and construction; Plastic headlamp Lens, sealed beam assembly. Asymmetrical head light, dipper and full beam, care of headlamp, Lens cleaners. Dynamic headlight beam control, Advanced Front lighting system (AFS) Types of bulbs. Reflector optics. Light sources – tungsten light Sources, tungsten halogen light sources, halogen infra-red reflective light sources, HID light sources (Xenon and bi-xenon), LED light sources, Blue vision head lamp. Auxillary lights, Brake light, Fog light, Flasher unit, warning lights and panel lights.

UNIT 5: ACCESSORIES

Fuel and oil pressure gauge, cooling water temperature gauge, electrical speedometer, amperemeter, wind-screen wiper, electrical horn and relay, cigarette lighter, Odometer, wind-shield washing equipment, engine rpm meter, glow plug indicator, cluster assembly. Radio and television Interference suppressors, electrical switches. Central locking of doors, power winding of window panes, car heaters AC, blower and air flow controls, Rear defogger.

Reference Books:

1. Automotive Electricals and Electronics, A.K. Babu, Khanna Publishing House
2. Automotive Electrical Equipment: PL Kohli
3. Modern Electrical Equipment: AW Judge
4. Automotive Electrical Equipment: WH Crouse

AUTOMOBILE DRAWING & DESIGN
(BVET502)

Unit 1

Drafting of sectional views of the following assemblies: (a) Cylinder block and crankcase of 2-wheeler, (b) Poppet valve assembly of a 4-stroke engine, (c) Piston assembly, (d) Connecting rod assembly, (e) Spark plug, (f) Injector.

Unit 2

Free hand line diagram of the following systems:

a. Fuel system of petrol engine
b. Fuel system of diesel engine
c. Cooling system of a multi-cylinder engine
d. Lubricating system of a multi-cylinder engine
e. Steering system of Maruti
f. Suspension systems of Maruti
g. Hydraulic Braking System of Maruti Zen (h) Air Hydraulic Braking System of TATA (i) Block diagram of Electronic Fuel Injection (EFI) system (j) Block diagram of Common Rail

Direct Injection (CRDI) system (k) Oxygen sensor (l) Fuel injector of EFI.

Unit 3

Drafting of sectional views of the following assemblies

1. Master cylinder
2. Wheel cylinder
3. Universal joint

Unit 4

Sketch layouts of

a. Depot
b. F.I. pump reconditioning shop
c. Electrical Workshop.

Unit 5

Design of the following components of an automobile engine

1. Piston assembly
2. Connecting rod assembly
3. Crank shaft
4. Flywheel

Reference Books:

1. Automobile Drawing: RB Gupta

AUTOMOBILE ENGINE SYSTEMS (BVET503)

UNIT 1

STARTING SYSTEM: Idea of engine starting-system circuit. Kick-starting system of 2 wheelers. Starting of mopeds. IGNITION SYSTEM: Idea of Battery-and-coil ignition circuit and its working. Compression ignition of diesel engines. LUBRICATION SYSTEM: Lubrication in 2 stroke engines - petroil and oil-injection. Lubrication in 4 stroke multi-cylinder petrol/diesel engines. Dry and wet sump lubrication. Full pressure and semi-pressure lubrication. Oil pump types. Oil pump drive, relief valve; pressure gauge. Oil filters. Full-flow and by-pass type filtering systems. Crankcase dilution, crankcase ventilation. Positive Crankcase Ventilation. Properties and functions of a good lubricating oil. Additives. Gradation of lubricating oil due to viscosity. SAE numbers. Service rating. 2T and Super 2T oils for use in 2-s engines.

UNIT 2

COOLING SYSTEM: Necessity of cooling of I.C. engines. Methods of cooling-air cooling, water cooling, liquid cooling. Shape of cooling fins. Field of application of air cooling. Water cooling system - Thermosiphon system, pump system, thermostat system of cooling. Thermostat - types. Radiators-different types, their construction and function. Pressurized cooling

system; radiator pressure-cap, surge tank. Cooling water temperature gauge. Anti- freeze and anti-corrosive additives. Coolants. Flushing of cooling system. AUTOMOBILE ENGINE FUELS: Types of fuels. Influence of structure. Calorific value. Requirements in fuels for I.C. engines. Properties. Fuel rating. Additives for S.I. and C.I. engine fuels. Specifications of petrol and diesel. Leaded and un-leaded petrol, Low Sulphur diesel. Enhancing Power output- Nitrox injection. Non-conventional fuels - LPG, CNG ethanol-mixed petrol. Properties, method of manufacture and their performance as I.C. engine fuels. Engine modifications required. Dual mode engine. Idea of Electric Vehicles and Hybrid Vehicles.

UNIT 3

FUEL SYSTEM OF DIESEL ENGINES: Fuel supply system. Filters (primary and secondary); positioning of filters. Feed pump. Solid and air injection system. Fuel injection pump, different types- plunger, distributor pump, their construction and working. Injectors. Governors. Types of governing. Combustion process in diesel engine. Diesel knock. Electronically Controlled Diesel Injection Pump. Common Rail Direct Injection. Piezoelectric effect and its use in CRDI.

UNIT 4

FUEL SYSTEM OF PETROL ENGINES: Gravity feed system used in 2-wheelers. Fuel supply circuit of 4-wheelers. Mechanical and electrical fuel pump. Electric fuel gauge. Petrol fuel filter. Air/fuel ratio. Variation of air/fuel ratio with speed. Air cleaners (wet & dry). Cyclone filter. CARBURETOR - Function and principle of working of simple carburetor. Carburetor controls- throttle, choke. Types of Carburetors- fixed jet carburetor (Solex type) and constant vacuum carburetors used in YAMAHA motorcycle. Twin-barrel carburetors. Classification of carburetors. Disadvantages of carburetors. Phenomenon of combustion and detonation. Pre-ignition.

UNIT 5

FUEL INJECTION SYSTEMS (PETROL ENGINE): TBI, MPI; the Electronic Module. Advantages of Electronic Fuel Injection (EFI). Block diagram of the EFI. The Air Intake System and the Idle Air Control System. Fuel Delivery System. Various sensors used with the ECM, their location and purpose. Fuel Injector. Idea of Gasoline Direct Injection ENGINE PERFORMANCE AND TESTING: Various losses in an engine. Heat balance, Morse method of finding IHP, Calculation of various quantities like IHP, BHP, mechanical efficiency, thermal efficiency, relative efficiency, overall efficiency, specific fuel consumption. Performance curves.

Reference Books:

1. Automotive Engines, A.K. Babu, Khanna Publishing House

AUTO BODY REPAIR, DENTING & PAINTING (BVET504)

Unit-I

Safety precautions and first aid, Proper use, care and maintenance of tools and equipments Introduction on types, function of body and panels, Procedure for inspection, removing and refitting of body components panels, doors and other body parts, Arc welding-basic electricity and welding power source.

Unit-I

Electrodes types, description and specification.arc

welding procedure Gas welding-gas welding, brazing and soldering procedures Description of gas cutting, Resistance welding-resistance welding, process-spot, seam and butt welding Details of MIG welding, Method of fixation of wind screen, glass Procedure for cut open, beat out, dents, stripping of old paints, sanding at different stages, smooth surface preparation at different stages, putty application &primer application at different stages of affected area(chronological order for repair of auto body)fitment of repaired part and aligning to the original shape

Unit-III

Personal safety – three key areas of risk eyes, skin and inhalation Details of personal protective, equipments-RPE,PPE Details of ingredients of paint, Procedure of refinishing process, Selection of consumable for doing painting work Procedure for doing painting (in chronological order) ,selection of materials, tools and equipments application of body filler for surface preparation, sanding on the affected area for smooth surface preparation, primer coating on the affected area, preparing affected surfaces for base coating, applying Base coat painting, clear coat painting for metallic paints, rubbing and polishing,

Unit-IV

Application of paint production, treatment/anti rust treatment Procedure for inspection of painting, work and fixing the wind screen glass Details of spray gun-types-standard air, gap design-different sizes of nozzles, Details of different types sanding - 15 equipments Different types of sand paper-grades, Possible defects in painting, objects, causes and its cure.

AUTOMOBILE WORKSHOP - I (BVET505P)

UNIT 1

Engine tuning: Meaning and scope of engine tuning. Necessity of engine tuning, Service data of Maruti: Alto, WagonR, Swift (Petrol & Diesel); Hyundai: Santro, Ford: Figo; Volkswagen: Polo; Chevrolet: Spark. Engine analysis and tuning with the help of diagnostic computer, Diesel engine injection timing checking

UNIT 2

Wheel Balance: Reasons of wheel imbalance, Effect of wheel imbalance on stability of vehicle. Static and dynamic balancing, Wheel balancing by the application of weights, Wheel Alignment: Meaning of wheel alignment, Various angles-camber, caster, KPI & toe - and their effect on steering stability, General values of popular Indian vehicles, Wheel alignment on computerised wheel aligner

UNIT 3

Measurement of Exhaust Pollution by various analysers such as Four Gas Analyser, Smoke meter, Nox analyser

UNIT 4

Use of Headlight aligner, Wheel aligner, automotive oscilloscope

UNIT 5

Servicing: Meaning and scope of servicing, Items attended to in servicing of a vehicle. Servicing a vehicle, Focussing and alignment of head lights

Reference Books:

1. Engine Service: Gary Lewis
2. Various Car's Manuals

AUTO BODY REPAIR, DENTING & PAINTING WORKSHOP (BVET506P)

AUTO BODY REPAIR Practice health & safety-familiarize, select, proper use, maintain and store – tools, equipments, Consumables clothing safety Simple basic practices on computer reading, service manuals, collision repair manuals and colour matching guide, Identification of different types of body, chassis and drive lines, Identification of location of parts and panels, Practice on operating the air compressor, Practice on periodical maintenance of air compressor Inspect and decide whether it can be repaired or replaced Remove and refit body panels, doors, floors, wheel boxes and fenders Practice on removing and refitting wind shield glasses Practice on arc welding on vehicle body Practice on gas welding, gas brazing, gas soldering and gas cutting on vehicle body Practice on resistance, spot, seam and butt welding on vehicle body Practice on MIG welding Safety precautions and first aid. Proper use, care and maintenance of tools and equipments, Introduction on types, function of body and panels Procedure for inspection, removing and refitting of body components panels, doors and

other body parts Arc welding-basic electricity and welding power source. Electrodes types, description and specification, Arc welding procedure Gas welding-gas welding, brazing and soldering procedures Description of gas cutting Resistance welding-resistance welding process-spot, seam and butt welding Details of MIG welding Method of fixation of wind screen glass Procedure for cut open, beat out dents, stripping of old paints, sanding at different stages, smooth surface preparation at different stages, putty application &primer application at different stages of affected area(chronological order for repair of auto body)fitment of repaired part and aligning to the original shape, Practice on plasma welding, Practice on minor repair of auto bodycut open, beat out, strip out old paint, make smooth surface by using different grades of sanders, apply putty on affected area and applying primer(repair damaged body which is ready for final paint) Apply base coat painting, Fit check the repaired components for alignment

AUTO BODY PAINTING Practice health & safety-familiarize, select, proper use, maintain and store – tools, equipments, Consumables clothing safety, Practice on removing paint from the damaged area Practice on mixing and applying body filler Practice on sanding(block) Practice on mixing and applying putty Practice on applying primer Practice on feather edge sanding and masking Base coat application Surface cleaning and degreasing Second and third coat application Preheating the vehicle and cooling Cutting, scuffing, rubbing and polishing

(ON-JOB-TRAINING –ANY ONE)

AUTOMOTIVE SERVICE TECHNICIAN (BVET507A(P))

AUTOMATION SPECIALIST (BVET507B(P))

ASSEMBLY LINE MACHINE SETTER (BVET507C(P))

PROCESS DESIGN ENGINEER (BVET507D(P))

QUALITY CONTROLLER (BVET507E(P))

KALINGA UNIVERSITY
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(SEMESTER-VI)
AUTOMOBILE ENGINE SYSTEMS
(BVET601)

UNIT 1

STARTING SYSTEM: Idea of engine starting-system circuit. Kick-starting system of 2 wheelers. Starting of mopeds. IGNITION SYSTEM: Idea of Battery-and-coil ignition circuit and its working. Compression ignition of diesel engines. LUBRICATION SYSTEM: Lubrication in 2 stroke engines - petroil and oil-injection. Lubrication in 4 stroke multi-cylinder petrol/diesel engines. Dry and wet sump lubrication. Full pressure and semi-pressure lubrication. Oil pump types. Oil pump drive, relief valve; pressure gauge. Oil filters. Full-flow and by-pass type filtering systems. Crankcase dilution, crankcase ventilation. Positive Crankcase Ventilation. Properties and functions of a good lubricating oil. Additives. Gradation of lubricating oil due to viscosity. SAE numbers. Service rating. 2T and Super 2T oils for use in 2-s engines.

UNIT 2

COOLING SYSTEM: Necessity of cooling of I.C. engines. Methods of cooling-air cooling, water cooling, liquid cooling. Shape of cooling fins. Field of application of air cooling. Water cooling system - Thermosiphon system, pump system, thermostat system of cooling. Thermostat - types. Radiators-different types, their construction and function. Pressurized cooling system; radiator pressure-cap, surge tank. Cooling water temperature gauge. Anti- freeze and anti-corrosive additives. Coolants. Flushing of cooling system. AUTOMOBILE ENGINE FUELS: Types of fuels. Influence of structure. Calorific value. Requirements in fuels for I.C. engines. Properties. Fuel rating. Additives for S.I. and C.I. engine fuels. Specifications of petrol and diesel. Leaded and un-leaded petrol, Low Sulphur diesel. Enhancing Power output- Nitrox injection. Non-conventional fuels - LPG, CNG ethanol-mixed petrol. Properties, method of manufacture and their performance as I.C. engine fuels. Engine modifications required. Dual mode engine. Idea of Electric Vehicles and Hybrid Vehicles.

UNIT 3

FUEL SYSTEM OF DIESEL ENGINES: Fuel supply system. Filters (primary and secondary); positioning of filters. Feed pump. Solid and air injection system. Fuel injection pump, different types- plunger, distributor pump, their construction and working. Injectors. Governors. Types of governing. Combustion process in diesel engine. Diesel knock. Electronically Controlled Diesel Injection Pump. Common Rail Direct Injection. Piezoelectric effect and its use in CRDI.

UNIT 4

FUEL SYSTEM OF PETROL ENGINES: Gravity feed system used in 2-wheelers. Fuel supply circuit of 4-wheelers. Mechanical and electrical fuel pump. Electric fuel gauge. Petrol fuel filter. Air/fuel ratio. Variation of air/fuel ratio with speed. Air cleaners (wet & dry). Cyclone filter. CARBURETOR - Function and principle of working of simple carburetor. Carburetor controls- throttle, choke. Types of Carburetors- fixed jet carburetor (Solex type) and constant vacuum carburetors used in YAMAHA motorcycle. Twin-barrel carburetors. Classification of carburetors. Disadvantages of carburetors. Phenomenon of combustion and detonation. Pre-ignition.

UNIT 5

FUEL INJECTION SYSTEMS (PETROL ENGINE): TBI, MPI; the Electronic Module. Advantages of Electronic Fuel Injection (EFI). Block diagram of the EFI. The Air Intake System and the Idle Air Control System. Fuel Delivery System. Various sensors used with the ECM, their location and purpose. Fuel Injector. Idea of Gasoline Direct Injection ENGINE PERFORMANCE AND TESTING: Various losses in an engine. Heat balance, Morse method of finding IHP, Calculation of various quantities like IHP, BHP, mechanical efficiency, thermal efficiency, relative efficiency, overall efficiency, specific fuel consumption. Performance curves.

Reference Books:

1. Automotive Engines, A.K. Babu, Khanna Publishing House

AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING (BVET602)

Unit-I: Refrigeration Fundamentals: Introduction to refrigeration and vapour compression system, cycle diagram (Carnot cycle, Reverse Carnot cycle, Simple vapour compression cycle, bell Coleman cycle), effects of various operating parameters on performance of A/C System, Vapour absorption refrigeration system (No numerical), Applications of refrigeration and air conditioning.

Unit-II: Refrigerants and Air Conditioning Components: Environmental concerns/Legislation for automotive A/C systems, types and properties of refrigerants, refrigerant oils, refrigerant piping. Future refrigerants, Air conditioning components: Compressors, Condensers, flow control devices, evaporators – Design guidelines, types, sizing and their installation. Accumulators, receiver driers and desiccants, Refrigerant charge capacity determination

Unit-III: Air distribution system: Comfort conditions, Air management and heater systems, air distribution modes (Fresh/ Recirculation, Face, Foot, Defrost, and Demist), A/C ducts and air filters. Blower fans, Temperature control systems (manual/ semiautomatic, automatic). Vehicle operation modes and Cool-down performance

Psychrometry: Psychometric properties, tables, charts, Psychometric processes, Processes, Combinations and Calculations, ADP, Coil Condition line, Sensible heat factor, Bypass factor.

Unit-IV: Load analysis and control devices: Load Analysis, Outside and inside design consideration, Factors forming the load on refrigeration and air conditioning systems, Cooling and heating load calculations, Load calculations for automobiles, Effect of air conditioning load on engine performance, Air conditioning electrical and electronic control, pressure switching devices, sensors and actuators.

Unit-V: Diagnostics, Trouble Shooting, Service and Repair: Initial vehicle inspection, temperature measurements, pressure gauge reading and cycle testing, leak detection and detectors, Sight glass. Refrigerant safety/handling, refrigerant recovery; recycle and charging, system oil, system flushing, odour removal, retrofitting. Removing and replacing components, Compressor service.

Reference Books:

1. Refrigeration & Air Conditioning, Sadhu Singh, Khanna Publishing House

VEHICLE PERFORMANCE AND TESTING (BVET603)

Unit-I: Vehicle Performance Parameters:Vehicle Performance parameters: Fuel economy, acceleration, deceleration, gradability, top speed, handling, comfort, life durability, EGR systems, Impact of vehicular systems on performance: Suspension system, Steering system, Brakes, Tyres, carriage unit. Catalytic converters function andconstruction, Lambda close loop control system for gasoline vehicles.

Unit-II: Drive train and Component testing:Vehicular transmission performance: comparison of automotive clutches,Epicyclic transmission, torque converter, final drive and differential, testing of vehicle components: clutch, gear box (for noise and shifting force), brake testing, wheels and tyre testing – tyre wear pattern identification and causes.

Unit-III: Vehicle testing:Vehicle Testing - Road test, free acceleration test, coast down test, passer by noise test, road load data acquisition for vehicle. Test tracks: Proving ground testing, high speed track, pavement track, corrugated track, mud track, steering pad, gradient track, deep wading through shallow water Laboratory testing:Testing on chassis dynamometer, transition testing (Euro III onwards), accelerated testing, virtual testing, evaporative emission testing, oil consumption testing, endurance test, high speed performance test. Collisions and Crash Testing:Crash testing: Human testing, dummies,

crashworthiness, pole crash testing, rear crash testing, vehicle to vehicle impact, side impact testing, crash test sensors, sensor mounting, crash test data acquisition, braking distance test.

Unit-IV: Comfort, Convenience and Safety: Seats: types of seats, driving controls accessibility, and driver seat anthropometry. Steering: steering column angle, collapsible steering, and power steering. Adaptive cruise control, navigation system, adaptive noise control, driver information system, Safety: Motor vehicle safety standards, active safety, passive safety, bio-mechanics Structural safety, energy absorption, ergonomic consideration in safety.

Unit-V: Noise Vibration and EMI:Noise and vibration: Mechanism of noise generation, engine noise and vibration, causes and remedies on road shocks, wind noise and measurement. Automobile testing instrumentation: Sensors types and selection, instrumentation for functional tests, model test and full scale testing.

ELECTRICAL & HYBRID VEHICLES – II (BVET604)

Unit -I:

Hybrid Architecture and Power Plant Specifications: Series configuration locomotive drives- series parallel switching- load tracking architecture. Pre transmission parallel and combined configurations Mild hybrid- power assist- dual mode- power split- power split with shift- Continuously Variable transmission (CVT)- wheel motors. Grade and cruise targets- launching and boosting- braking and energy recuperation- drive cycle implications.

Unit -II:

Sizing the Drive System and Energy Storage Technology: Matching electric drive and ICE; sizing the propulsion motor; sizing power electronics. Battery basics; lead acid battery; different types of batteries; battery parameters

Unit-III:

Fuel Cells:Fuel cell characteristics- fuel cell types – alkaline fuel cell- proton exchange Membrane; direct methanol fuel cell- phosphoric acid fuel cell- molten carbonate fuel cell- solid oxide fuel cell- hydrogen storage systems- reformers- fuel cell EV- super and ultra capacitors- PEM fuel cell vehicles.

Unit IV:

Energy Storage: Battery based energy storage: Battery basics, Lead acid (Pb-Acid) battery, Nickel-Cadmium (NiCd) battery, Nickel-Metal-Hydride (NiMH) battery, Lithium-ion (Li-ion) battery, Lithium-polymer (Li-poly) battery, Ultra capacitors.

Unit -V: Nonelectric Hybrid Systems: Short term storage systems flywheel accumulators. continuously variable transmissions hydraulic accumulators hydraulic pumps/motors- pneumatic hybrid engine systems operation modes.

Reference Books:

1. Electric & Hybrid Vehicles, A.K. Babu, Khanna Publishing House

AUTOMOTIVE RAC LAB (BVET605P)

Experiments:-

1. Test on vapor compression test rig.
2. Test on air conditioning test rig.
3. Study of various methods of transport refrigeration systems.
4. Study and demonstration on car and bus air conditioning system.
5. Study of latest trends in automotive refrigeration systems.

6. Study and demonstration of controls in refrigeration.
7. Study of different components with the help of cut sections/models/charts- Compressor, Condenser, Evaporators, Expansion device, Blower fans, Hating systems etc.
8. Study of installation/operations/maintenance practices for refrigeration systems.
9. Study of leak testing and leak detection methods.
10. Visit to maintenance shop of automotive air conditioning and writing report on it.

VEHICLE PERFORMANCE AND TESTING LAB (BVET606P)

Experiments:-

1. Estimation of power requirement for vehicle propulsion by taking actual vehicle example.
2. Perform coast down test to find vehicle inertia.
3. On road fuel consumption test at different speeds.
4. Brake efficiency measurement
5. Pass- by noise test.
6. Free acceleration test.
7. Vibration measurement in passenger compartment
8. Laboratory testing of vehicle on chassis dynamometer for performance
9. Laboratory testing of vehicle on chassis dynamometer for emission.
10. Report based on visit to vehicle testing and research organization.
11. On road emission testing of petrol and diesel vehicles for PUC/RTO

(ON-JOB-TRAINING –ANY ONE) AUTOMOTIVE SERVICE TECHNICIAN (BVET607A(P)) AUTOMATION SPECIALIST

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