Proposed 3rd Year Programme Structure of B. Voc in Automotive Technology

Semester V (Job Role: Automotive Service Technician Level 7)

Course Code	Course Title	Credits			Total Credits	Total Hours	Total Marks	Marks Distribution		
		L	T	P				Internal Assessment	External Assessment	
									Theory	Practical
AM5 S20	Vehicle Body Engineering	01	01	02	04	84	100	20	20	60
AM5 S21	Motor Vehicle Act and Transport Management	02	01	02	05	98	125	25	40	60
AM5 S22	Automotive Braking & Steering System	02	01	02	05	98	125	25	40	60
AM5 S23	Onsite Training	0	0	04	04	-	100	40	0	60
Skill Component (A)							**450**	**110**	**100**	**240**
Total							**450**			

Semester VI (Job Role: Auto Service Technician Level 7)

Course Code	Course Title	Credits			Total Credits	Total Hours	Total Marks	Marks Distribution		
		L	T	P				Internal Assessment	External Assessment	
									Theory	Practical
AM6 S24	Advanced Vehicle Maintenance And Diagnostics	02	01	02	05	98	125	25	40	60
AM6 S25	Garage Organization & Workshop Practice	02	01	02	05	98	125	25	40	60
AM6 S26	Project Work	0	0	08	08	-	200	80	0	120
Skill Component (A)							**450**	**130**	**80**	**240**
Total							**450**			

Proposed 3rd Year Programme Structure of B. Voc in Automotive Technology

Semester V (Job Role: Auto Service Technician Level 7)

Course Code	Course Title	Credits	Total Credits	Remarks
AM5 S20	Vehicle Body Engineering	04	18	Skill Component
AM5 S21	Motor Vehicle Act and Transport Management	05		
AM5 S22	Automotive Braking & Steering System	05		
AM5 S23	Onsite Training	04		

Semester VI (Job Role: Auto Service Technician Level 7)

Course Code	Course Title	Credit	Total credits	Remarks
AM6 S24	Advanced Vehicle Maintenance And Diagnostics	05	18	Skill Component
AM6 S25	Garage Organization & Workshop Practice	05		
AM6 S26	Project Work	08		

- 'AM' stands for Automotive
- 'S' stands for Skill Component
- Illustrations: AM1S01 stands for AM1 means Automotive semester one and S01 means skill component one (course code) similarly AM2S06 stands for Automotive semester two and S06 stands or skill component six (course code).

Course Code: AM5 S20 **Course Title: VEHICLE BODY ENGINEERING**
Credits: 04

MODULE I: CAR BODY DETAILS

Types of Car body - Saloon, convertibles, Limousine, Estate Van, Racing and Sports car – Visibility regulations, driver's visibility, improvement in visibility and tests for visibility. Driver seat design -Car body construction-Various panels in car bodies. Car body construction; design criteria. Crash tests on full scale model, Dummies and Instrumentation. Safety aspect of car body.

MODULE II: AERODYNAMICS

Basics, Vehicle drag and types, various types of forces and moments, effects of forces and moments, various body optimization techniques for minimum drag, Principle of wind tunnel technology, flow visualization techniques, tests with scale models, aerodynamic study for heavy vehicles.

MODULE III: BUS BODY DETAILS

Types of bus body: based on capacity, distance travelled and based on construction. Bus body lay out for various types, floor height, engine location, entrance and exit location, seating dimensions. Types of metal sections used – Regulations – Constructional details: Conventional and integral.

MODULE IV: COMMERCIAL VEHICLE DETAILS

Types of commercial vehicle bodies - Light commercial vehicle body. Construction details of commercial vehicle body - Flat platform body, Trailer, Tipper body and Tanker body, Driver's cab design - Regulations.

MODULE V: BODY MATERIALS

Types of materials used in body construction-Steel sheet, timber, plastics, GRP, properties of materials. CRP-properties of materials-applications in vehicle body, Interior materials-requirements-types-applications, Glasses-types, laminated glass-concept-purpose, defrosting in glasses-concept-purpose.

Reference Books:

Vehicle Body Engineering Powloski. J
Body Construction and Design Giles. J.C
Aerodynamics of Road Vehicles W.H. Hucho Butter

List of Practical's:

1.1 Identify, dismantle and assemble the panels.
1.2 Identify the floor panel assembly and front cowl assembly.
1.3 Identify the quarter panel, roof assembly and front end assembly.
1.4 Identify, dismantle and assemble the radiator, bumper and hood.
1.5 Identify, dismantle and assemble door glass, interior hardware and trim.
1.6 Identify, dismantle and assemble seats of automobile.
1.7 Identify glass and wind shield and rear window glass mountings.

Course Code: AM5 S21 **Course Title: Motor Vehicle Act and Transport Management**

Credits: 05

UNIT-1: Transport Management: History of transport, modes of transport, types of transport. Transport organization structure, operations, General set up, transport industry, government / (STU) State Government Undertakings and private Bus transport organizations. Bus depot organization structure. Truck fleet operators' organization. Economics of Road Transport- Theory of fares and cost of services, fare charging, costing and statistics of operating cost.

UNIT-2: Organization of Transport Services:

Records and fleet management, vehicles schedule, booking and reservation, statistical records and shipment center, recording of goods transport. Geographical considerations, economic factors, vehicles used, planning of trips. Concept of Bus Rapid Transport System (BRTS) operations.

UNIT-3: Motor Vehicle Act:

Acts & definitions, Licensing of drivers and conductors, registration of vehicles, control of transport, RTO and other regulations, offences, penalties and procedures, types of form and procedures, licensing of taxies and buses, rules and regulations, testing and passing of vehicles. **Accident & Prevention**-Vehicle accident, laws, injury, safety precautions, road transport regulations. **Insurance & Finance-** Classes/types of insurance, accident claims and settlements, duty of driver in case of accident, hire purchase.

UNIT-4: Pollution Under Control (PUC):

Pollution Under control certification agency, Authority & procedure for PUC certification agency. Harmful exhaust gas constituents, permissible limits, Euro / Bharat Stage -I, II, III, IV, VI norms and implementation, testing and measurements.

UNIT-5: Motor Transport and Research Organization:

Structure and working of Transport Organizations - MSRTC, BEST. Role of automobile engineer in Motor Transport Industry. Functions and Role of Research Organizations: Central Institute of Road Transport, Automotive Research Association of India, Vehicle Research Development and Establishment, Central Road Research Institute, Petroleum Conservation and research association.

Reference Books:

Motor Vehicle Act and Transport Management: Khilery, V.S; Sharma, Satpal; Gupta, Shaman.
Central M.V. Rules 1989: Ministry of Transport, Central Govt.
Bus and Coach Operation: Kitchin, L.D.

List of Practical's:

1. PREPARE A REPORT BY COLLECTING DIFFERENT FORMS USED IN RTO AND FILL THEM.
2. PREPARE A REPORT ON TRAFFIC SIGNS AND SIGNALS.
3. PREPARE A REPORT ON BUYING AND SELLING OLD VEHICLE.
4. INTERPRET THE MOTOR VEHICLE ACT AND TRAFFIC RULES.
5. PREPARE A REPORT ON INSURANCE CLAIMS, SURVEY AND SETTLEMENT OF A VEHICLE.

NOTE: STUDENTS SHOULD PREPARE A REPORT OF 5 PAGES OR MORE FOR EACH PRACTICAL ACTIVITY, ALSO COLLECT/RECORD PHYSICAL EVIDENCES FOR THEIR PORTFOLIO WHICH WILL BE USEFUL FOR THEM IN FUTURE.

Course Code: AM5 S22 **Course Title: Automotive Braking & Steering System**
Credits: 05

Unit-1: Introduction to Braking System:
Purposes of brake system. Principle of braking. Types of brake system Classification of automotive brake system. Brake master cylinder-functions and Operation. Tandem master cylinder. Electronically Controlled Brake System- ABS,EBD and Sensotronic brake control system (SBC).

UNIT-2: Hydraulic Brakes:
Hydraulic brake system. characteristics of different type of brake fluid & its use. Components of hydraulic brake system. Construction of wheel cylinder, brake shoe, brake shoe lining and brake drum
& callipers. Operation of hydraulic drum brakes. Operation of hydraulic disc brakes. vacuum assisted hydraulic brake- Components and Operation. Air assisted Hydraulic brake Operation of servo unit. Uses of vacuum pump. Advantages & disadvantages of disc brake mechanism.

UNIT-3: Mechanical Brakes and Air Brakes:
Mechanical brake system. Components of mechanical brake system. Operation of mechanical brake system. air brake. Purposes, construction, operation of air brake. importance of air compressor, unloaded valve, air regulator valve, brake chamber and brake valve.

UNIT-4: Steering system:
purpose of steering system. types of steering system. steering linkage. operation of conventional (mechanical) steering system. different types of steering gear box. telescopic steering wheel. collapsible steering column. four wheel steering system.

UNIT-5: Hydraulic and Electric Power Steering:

different types of power steering system. operation of integral power steering system. linkage booster power steering system. construction & operation of rack & pinion power steering system. types of power steering pump. operation of vane type power steering pump. electric motor power steering (EMPS) system. Components and operation of EMPS.

Reference Books:

Automotive Chassis Systems, 4th, 5th or 6th Edition, James Halderman, Pearson Hall Publishing
Automobile Engineering – Dr Kirpal Singh

List of Practical's:

1. Remove and then assemble master cylinder, wheel cylinder, brake shoe, brake drum, brake disc, etc.
2. Bleed the brake system.
3. Disassemble and assemble the master cylinder.
4. Identify, remove and assemble the components of lower steering system.
5. Identify, remove and assemble the components of power steering system.
6. Inspect the steering gearbox.
7. Inspect and adjust the wheel alignment of a car.

Course Title: ONSITE TRAINING **Course Code: AM5 S23**

Credits: 04

ONSITE TRAINING: Onsite Training will be done at the end of the semester.

The objective of this training is to:

1. Expose the student to industrial training / field procedures and practices and so as to have appreciation of the size and scale of operations.

2. Co-ordinate concepts, principles and practices taught in the classroom in their application in solving field / industrial tasks / problems.

SEMESTER VI

Course Code: AM6 S24 **Course Title: ADVANCED VEHICLE MAINTENANCE AND DIAGNOSTICS**
Credits: 05

Unit-I: MAINTENANCE, RECORDS AND SCHEDULES:
Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists. Maintenance of records on inspection, diagnosis and repair activities, log sheets and other forms, safety precautions in maintenance. health, environmental policies and regulations for the workplace. standard operating procedures of the organisation/ dealership for inspection and diagnosis of faults in a vehicle.

Unit II: ENGINE MAINTENANCE - REPAIR AND OVERHAULING
Dismantling of engine components and cleaning/cleaning methods, engine assembly, visual inspections, use of diagnostic OBD scanner tool, minor and major reconditioning of various engine components, special tools used for maintenance overhauling, engine tune up.

Unit-III: CHASSIS MAINTENANCE - REPAIR AND OVERHAULING
Automobile clutch and gear box servicing and maintenance, maintenance and servicing of propeller shaft and differential system. Maintenance and servicing of suspension systems, Brake systems. Steering systems, overhauling and maintenance. special tools used for maintenance of chassis, Computerized Wheel alignment and wheel balancing.

Unit IV ELECTRICAL SYSTEM MAINTENANCE - SERVICING AND REPAIRS
Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems. Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

Unit V: MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VECHICLE BODY
Servicing and maintenance of fuel system of different types of vehicles, calibration of FIP. Servicing and maintenance of Cooling systems, water pump, radiator, thermostat, anti-corrosion and antifreeze additives. Lubrication system maintenance, lubricating oil changing, greasing of parts. Vehicle body maintenance, Minor and major repairs. Door locks and window glass actuating system and their maintenance.

Reference Books:

1. Kirpal Singh, Automobile Engineering, Volume 1& 2 , Standard Publishers distributor, 2014
2. R.B.Gupta, Automobile Engineering, Satyaprakasan publications, 2012
3. Service Manuals from Different Vehicle Manufacturers.

List of Practical's:

1. Complete and maintain workplace records on inspection, diagnosis and repair activities.
2. To make an assessment of service and repair needs of the vehicle including clutch system, steering system, all electrical systems etc.
3. Utilise various tools including computer-based diagnostic tools for accurate assessment of vehicle's operating parts and systems.
4. Collect sufficient diagnostic information to enable an accurate diagnosis of transmission and driveline system faults.
5. Servicing and maintenance of fuel system of different types of vehicles.
6. Servicing and maintenance of cooling system of different types of vehicles.

Course Code: AM6 S25 **Course Title: Garage Organization & Workshop Practice**
Credits: 05

UNIT 1: LAYOUT OF GARAGE AND TOOLS & EQUIPMENT

Layout of a fully equipped modern garage. Car Washing Station equipment (compressor, washer, hydraulic ramp and other lifting devices etc.) Denting and painting tools and equipment. Workshop safety and health policies. Role of bodyshop service advisor.

UNIT 2: GARAGE PROCEDURE

A typical workshop / bodyshop organisation chart. Need & importance of Record Keeping, Duties of garage employees. 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. Role of Body shop and workshop manager**.** Role of Surveyor.

UNIT 3: STORE ORGANISATION

Stores and store-keeping procedure. OEM Spare parts, 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 spare parts manager and purchase officer. Role of spare parts manager. 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.

REFERENCE BOOKS

1 Automotive Mechanics - Crouse-Anglin
2 Auto Mechanics - Mitchell

List of Practical's:

1. Identify the tools used in auto workshop.
2. Identify the special tools and equipment used in auto workshop.
3. Prepare the specification of common tools and equipment.
4. Perform the wheel balancing.
5. Perform the tyre changing process.
6. Identify different parts of automotive scanner.
7. Perform scanning of an automobile engine and diagnose its problems.
8. How to prepare and analyse the job card for necessary repairs.
9. Prepare the organisational structure of employees of bodyshop/workshop.

Course Title: PROJECT WORK

Course Code: AM6 S26 **Credits: 08**

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

Project Report on any project of relevant to Auto industry like:

1. **Design and fabrication of suspension system**
2. **Design and fabrication of steering system**
3. **Design and fabrication of braking system**
4. **Electromagnetic shock absorber**
5. **Go-Kart**