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Shri AcharyaratnaDeshbhooshanShikshanPrasarak Mandal, Kolhapur

Mahavir Mahavidyalaya, Kolhapur (Autonomous)

Affiliated to Shivaji University, Kolhapur

Syllabus for Choice Based Credit System (CBCS)
Bachelor of Vocation (B. Voc.) Programme

Programme	**Bachelor of Vocation in AUTOMOBILE.**
Part	**I**
Semester	**II**
Course Code	**BVC21**
Course Name	
Course Title	**--**
Paper No.	**--**

Under the Faculty of Interdisciplinary Studies

(To be introduced from Academic Year 2021 – 22 onwards)

Subject to the revisions& modifications made from time to time

Mahavir Mahavidyalaya, Kolhapur (Autonomous)

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(New syllabus under Autonomy to be introduced from June, 2021 onwards)

A) Primary Information:			
Programme	**Bachelor of Vocation(B. Voc.) AUTOMOBILE.**		
Part	**I**	Semester	**II**
Course	C.I. Engines.	Course Code	**BVC21**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2021 – 22**
Total Credits	**03**	Contact Hours	**04 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To acquire basic knowledge of C.I. Engines.
ii)	To get broad knowledge in C.I. Engines.
iii)	To get interests in construction working C.I. Engine parts.
iv)	To study details of C.I. Engines.

C) Course Syllabi:
(CR = Credits / IH: Instructional Hours)

Units	**CR**	**IH**
Unit I : Introduction to C.I. Engines	0.75	12
1.1 Introduction, Nomenclature.		
1.2 Advantages of diesel engines.		
1.3 Thermodynamics cycle of diesel engine.		
1.4. Four stroke diesel engine, Two stroke diesel engine, Comparisonof two stroke and four stroke cycle engine,		
Unit II : Engine Components& Intake-Exhaust Systems.	0.75	12
2.1 Cylinder block, cylinder liner, types of liner, cylinder head, gaskets, type of gaskets, Piston, piston ring, pin, Crank shaft, camshaft, connecting rod, valve, valve cooling, valve mechanisms, valve timing, port-timing diagram, manifolds, silencers, flywheel.		
2.2 Air filtering system, Types of air cleaners – dry, wetair cleaners, Intake manifold arrangements for single and multi cylinder engines		
2.3 Exhaust system – Exhaust manifold types, mufflers and silencers, exhaust pipes		
Unit III : Engine Fuels & Fuel System.	0.75	12
3.1 Types of fuels, fuel properties, SI and CI engine fuels, Alternative fuels-CNG fuel diesel engine,		

3.2 Requirement of fuel injection system.		
3.3 Various components of fuel injection system.		
3.4 DI and IDI engines, Working of common rail fuel injection system		
Unit IV : Superchargers and Turbochargers	0.75	12
4.1 Need of supercharging.		
4.2 Types of superchargers.		
4.3 Effect of supercharging on engine, benefits, disadvantages.		
4.4. Need of turbo charging, types of turbo charging, effect of turbo charging on engine, benefits, disadvantages		

D) Reference Materials	
D1) Text Books for Reading	
1.	Internal combustion engine :M.L Mathur R.P.Sharma, Dhanpat Rai Publication
2.	Automobile Dr. Kirpal Singh
3.	The Motor vehicle Newton, Steeds, Garrett, Butterworth Heinmann
D2) Books for Reference	
1.	Automobile Vol.-2 Anil Chikara, Standard Publishers.
2.	Automobile Mechanics Crouse / Anglin. TATA McGRAW – HILL
3.	Automobile R.B. Gupta, Satya Prakashan Automobile Vol.-2 Anil Chikara, Standard Publishers.

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Seminars

F) Course Outcomes:		**Blooms Taxonomy**
CO1	Apply the knowledge of C.I. Engines.	
CO2	Research related skills	
CO3	Explain industrially importance of C.I. Engines.	
CO4	Apply concepts in practicals.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.		
3.		
4.		
5.	**Total Marks**	**10**

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	**Total Marks**	**40**

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(New syllabus under Autonomy to be introduced from June, 2021 onwards)

A) Primary Information:			
Programme	**Bachelor of Vocation(B. Voc.) AUTOMOBILE.**		
Part	**I**	Semester	**II**
Course	Vehicle Systems.	Course Code	**BVC22**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2021 – 22**
Total Credits	**03**	Contact Hours	**04 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To study the different vehicle systems.
ii)	To acquire basic knowledge of all systems in vehicle.
iii)	To develop awareness of all systems in vehicle
iv)	To study the needs and essential requirements systems.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Units	**CR**	**IH**
Unit I : Steering System.	0.75	12
1.1 Types of front axle-Dead axle, live axle. Type of stub axle arrangements Elliot, reverse Elliot, Lamoine, reverse Lamoine.		
1.2 Steering system. Steering linkages, Steering geometry and its effects– Caster, camber, king pin inclination, toe in–toe out, Correct Steering angle. Under steering and over steering, Turning radius		
1.3 Construction, working and application of Steering gearbox-rack and pinion type, recirculating ball type, and worman droller type.		
Unit II : Brakes & Suspension.	0.75	12
2.1 Introduction, Function and necessity of brakes. Classification of brakes and braking systems. Construction and working of –disc brake and drum brake.		
2.2 Friction materials		
2.3 Construction and working of-Mechanical braking system, Hydraulic Braking system, Air braking system, Hydraulic operated air braking system and vacuum assisted braking system. Concept and working of antilock braking system. Parking brake Properties of brake fluids and their specifications.		
2.4 Rigid and independent Suspension.		

2.5 Types of Independent suspension system- Mc Pherson strut, wishbone type, Semi-elliptical Leaf spring, coil spring, torsion bar arrangement, Construction and working of Air Suspension System, Construction and working of-Shock absorbers-Telescopic and Gas filled, Anti roll baror stabilizer bar.		
Unit III : Vehicle Body.		
3.1 Vehicle body types, Body materials, Body component joining methods, Seat layout, Type of seats.	0.75	12
3.2 Type of wheels, Wheel construction, Material, Balancing, Tire types, Tire specifications, tire material, Tire tread and pattern, Tire inflammation pressure, Tire maintenance,		
3.3 Application and criteria for selection of wheels and tyres.		
Unit IV : Air Conditioning System		
4.1 Fundamentals of Refrigeration and air conditioning.		
4.2 Vapor compression cycle with components in the circuit.		
4.3 Layout and operation of HVAC.		
4.4 Type of refrigerants in car and their properties. Human comfort conditions.Temperature control system, humidity Control.		

D) Reference Materials	
D1) Text Books for Reading	
1.	Ramlingam K.K. Automobile Scitech Publication
2.	Kirpal Singh Automobile Standard Publication
3.	Anil Chikara Automobile Satya Prakashan New
4.	R.B. Gupta Automobile Satya Prakashan New
D2) Books for Reference	
1.	S. Srinivisan Automotive Mechanics Tata McGraw-Hill
2.	Crouse/Anglin. Automobile Mechanics Tata McGraw-Hill

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Seminars

F) Course Outcomes:		**Blooms Taxonomy**
CO1	Apply the knowledge vehicle systems.	
CO2	Research related skills	
CO3	Get industrially importance of vehicle systems	
CO4	Apply industrial applications different systems.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.		
3.		
4.		
5.	**Total Marks**	**10**

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	**Total Marks**	**40**

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(New syllabus under Autonomy to be introduced from June, 2021 onwards)

A) Primary Information:			
Programme	**Bachelor of Vocation(B. Voc.) AUTOMOBILE**		
Part	**I**	Semester	**II**
Course	**Automotive Electrical**	Course Code	**BVC23**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2021 – 22**
Total Credits	**03**	Contact Hours	**04 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To understand Electrical system in automobile.
ii)	Inculcate the basic concept of Electrical system in automobile.
iii)	Develop understanding about Electrical system in automobile.
iv)	To study the details of Electrical system in automobile.

C) Course Syllabi:
(CR = Credits / IH: Instructional Hours)

Units	**CR**	**IH**
Unit I : Electrical & Electronic Components		
1.1 Purpose and operation of electrical components like switches, relays, solenoids, buzzers, and resistors.		
1.2 Purpose of circuit protection devices like fuses, maxi fuses, circuit breakers (Manual and automatic resetting types.) and fusible links. Testing of circuit defects like open circuits horts, shorts to grounds, voltage drop	0.75	12
1.3 Working of Electromagnetic gauges like temp Gauges, fuel gauge, engine oil pressure gauge, Speedo-meter gauge.		
Unit II : Battery & Lighting accessories		
2.1 Lead acid battery–components &operation. Maintenance free battery–construction. Concept of Low maintenance battery. Battery ratings and specifications. Battery maintenance and safety precautions.	0.75	12
2.2 Battery testing, Battery charging Jump starting-Procedure and precautions. Factors affecting battery life.Battery failures		
2.3 Automatic head light dimming,Automatic on /off head light	0.75	12

with time delay, key less entry,anti-theft system, Purpose &operation of automatic door lock system.		
Unit III : Starting And Charging System		
3.1 Construction and working of starting system. Testing of starting system–Quick testing, Current draw test, Insulated circuit resistance test, Ground circuit test, No crank test, free speed test.		
3.2 Construction & operation of alternator. Initial excitation and self excitation. Alternator testing–Current output test, Field current draw test. Regulator output test.		
3.3 Alternator components testing-rotor, stator, Internal Regulator and rectifier. Regulation-Electronic, Computer Regulation circuit lay out and operation. Operation of charge indicator light circuit.		
Unit IV : Ignition Systems	0.75	12
4.1 Need of ignition system. Classification of ignition systems on basis of–Magneto ignition system-construction and working of CDI system. Components of ignition system:-Ignition coil types, Distributor, sparkplug, cords, and condenser.		
4.2 Advance & retard timing mechanism-construction and working. Electronic (or solid state) ignition system with distributor circuit diagram and working..		
4.3 Distributor less/computer controlled oil ignition system operation. Sensors and Ignition Control Module for triggering and timing of spark.		

D) Reference Materials	
D1) Text Books for Reading	
1.	**Barry Hollenbeck** Automotive Electricity,
D2) Books for Reference	
1.	**P.L. Kohli** Automotive ElectricalEquipment Tata McGraw-Hill

E) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Seminar.

F) Course Outcomes:		**Blooms Taxonomy**
CO1	Explain the concept of Electronics & Electricals of vehicles.	
CO2	Get to know Importance of Electronics & Electricals of vehicles	
CO3	Apply concept of Electronics & Electricals of vehicles.	

G) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

H) Suggested techniques for Continuous Internal Evaluation (10 Marks)		
1.	Home assignments	
2.		
3.		
4.		
5.	**Total Marks**	**10**

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	MCQ	10
2.	Short Answer	10
3.	Short Note	10
4.	Long Answer	10
5.	**Total Marks**	**40**

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A) Primary Information:			
Programme	**Bachelor of Vocation (B. Voc.) AUTOMOBILE.**		
Part	**I**	Semester	**II**
Course	**Two Wheeler Maintenance**	Course Code	**Practical BVC21**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2021 – 22**
Total Credits	**05**	Contact Hours	**06 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To study the basics of two wheeler maintenance.
ii)	To develop Analytical practical knowledge of two wheeler maintenance
iii)	To develop awareness of faults in two wheeler.
iv)	To study the details of two wheeler maintenance.

C) Course Syllabi:
(CR = Credits / IH: Instructional Hours)

Practicals	**CR**	**IH**
1. General servicing of Two Wheeler and 3 wheeler, washing, cleaning, oiling, greasing and lubricating.	05	75
2 Adjusts control cables for brake, clutch and accelerator. Tightens loose parts and makes necessary fittings and connections.		
3. Clean spark plug. Changes engine oil starts engine and tunes it up.		
4. Practice on removal of fuel tank.		
5. Dismantling the two wheeler engine, cleaning and inspecting the parts, checking engine bore, piston rings, connecting rod.		
6. Remove carburettor dismantle, check, clean and set.		
7. Removing clutch assembly from Two-wheeler and three wheeler cleaning and inspecting parts. Replacing defective parts. Fitting clutch assembly.		
8. Practice on removing front wheel from vehicle, inspection of front wheel axle Run out, front wheel bearing inspection, front wheel rim run out, brake drum inspection.		
9. Practice on removal of crankshaft, inspection of crank shaft, and practice on kick starter disassembly, inspection and assembly.		
10. Practice on removal of battery, and practice on battery charging, ier, inspection, and assembling.		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Garage visits

E) Course Outcomes:		Blooms Taxonomy
CO1	Apply the knowledge of Two wheeler maintenance.	
CO2	Research related skills	
CO3	Get industrially importance of Two wheeler maintenance	
CO4	Able to apply concepts of Two wheeler maintenance.	

F) Scheme of Course Evaluation		
1.	End Semester Examination (ESE)	40
2.	Continuous Internal Evaluation (CIE)	10
3.	**Total Marks**	**50**

G) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	Practical (Lab-work)	25
2.	Submission Practical record book & project report	15
3.	Viva-voce	10
4.	**Total**	**50**

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A) Primary Information:			
Programme	**Bachelor of Vocation(B. Voc.) AUTOMOBILE.**		
Part	**I**	Semester	**II**
Course	**Four Wheeler Maintenance**	Course Code	**Practical BVC22**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2021 – 22**
Total Credits	**05**	Contact Hours	**06 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To study the basics in maintenance.
ii)	To get the basic knowledge of 4 wheeler maintenance.
iii)	To develop practical knowledge in 4 wheeler maintenance.
iv)	To study the details in maintenance and apply in practical.

C) Course Syllabi:

(CR = Credits / IH: Instructional Hours)

Practicals	**CR**	**IH**
1. Dismantling of unserviceable engine- cleaning, studying the parts in the engine and assembling the engine.	05	75
2. Checking and cooling system for overheating, cleaning radiators, dismantling, cleaning, assembling and testing water pumps, reverse flushing the system.		
3. Studying the lubrication, oil flow system in engine. Over-hauling oil filters, oil pump.		
4. Assembling of pressure plate- checking run out of fly wheel and aligning clutch assembly with flywheel.		
5. Dismantling a four-speed sliding mesh gear box. Cleaning inspection of parts for wear/ damage. Assembling the gear box and filling in oil.		
6. Removing brake drums and adjusting brake shoes.		
7. Overhaul differential. Checking tooth contact in crown and pinion and adjusting backlash.		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion

iv)	Garage visits.

E) Course Outcomes:		Blooms Taxonomy
CO1	Apply the knowledge of 4 wheeler maintenance	
CO2	Be able for details of 4 wheeler maintenance	
CO3	Explain industrially importance of 4wheeler maintenance.	
CO4	Apply concepts 4 wheeler maintenance in practical.	

I) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	Practical (Lab-work)	25
2.	Submission practical record book & project report	15
3.	Viva-voce	10
4.	**Total**	**50**

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A) Primary Information:			
Programme	**Bachelor of Vocation(B. Voc.) AUTOMOBILE.**		
Part	**I**	Semester	**II**
Course	**Petrol &Diesel Engine maintenance.**	Course Code	**Practical BVC23**
Paper No.	**--**	Course Type	**Semester**
Total Marks	**50 Marks**	Implementation	**2021 – 22**
Total Credits	**05**	Contact Hours	**06 / Week**
Course Title	**--**		

B) Course Objectives:	
i)	To study the basics Different methods maintenance of engines.
ii)	To get the basic knowledge of maintenance of engines.
iii)	To develop awareness maintenance of engines.
iv)	To study the details of maintenance of engines & apply in practical.

C) Course Syllabi:
(CR = Credits / IH: Instructional Hours)

Practicals	**CR**	**IH**
1. Removing diesel engine from the vehicle and Refitting the diesel engine on the vehicle.	05	75
2. Dismantling, cleaning, inspection and Servicing of cylinder head & rocker arm shaft assembly.		
3. Setting valve timing.		
4. Removing petrol engine from a vehicle and Refitting petrol engine on the vehicle.		
5. Servicing inlet & exhaust manifolds, silencer & tail pipe.		
6. Dismantling, cleaning, inspection and assembling of timing gear drive /chain drive/ belt drive.		

D) Suggested methods of Teaching:	
i)	Online teaching/ Offline
ii)	Power point presentation
iii)	Group discussion
iv)	Garage visits.

E) Course Outcomes:		Blooms Taxonomy
CO1	Apply the knowledge of maintenance of engines.	
CO2	Get detailed knowledge in different functions of engines.	
CO3	Explain industrially importance of engines maintenance.	
CO4	Apply concepts of maintenance of engines in practical.	

F) Question Paper Pattern (40 Marks)		
Q. No.	**Nature / Type of Question**	**Marks**
1.	Practical (Lab-work)	25
2.	Submission practical record book & project report	15
3.	Viva-voce	10
	Total	**50**

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