மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்

MANONMANIAM SUNDARANAR UNIVERSITY

SYLLABUS FOR DIPLOMA IN FOUR-WHEELER MECHANISM PROGRAM OFFERED THROUGH DIRECTORATE OF VOCATIONAL EDUCATION (COMMUNITY COLLEGES AND VOCATIONAL SKILL DEVELOPMENT CENTRES) FROM 2019 – 2020

கல்விசார் நிலைக்குழுக் கூட்டம்

MEETING OF THE STANDING COMMITTEE ON ACADEMIC AFFAIRS HELD ON WEDNESDAY THE 22nd JANUARY 2020

Program Code: 5228

DIPLOMA IN FOUR-WHEELER MECHANISM
நான்கு சக்கர இயந்திரவியல் பட்டயம்

SCHEME OF EXAMINATION

Subject Code	Title of The Course	Credit	Hours	Passing Minimum
Semester I				
C19FM11/E19FM01	Automotive Engines-I	6	90	40/100
C19FM12/E19FM02	Automotive Engines-II	6	90	40/100
C19FM13/E19FM03	Transmission system-I	6	90	40/100
C19CE10/E19CE10	Communicative English	6	90	40/100
C19FMP1/E19FMP1	Practical I-Automobile Engines	4	120	40/100
Semester II				
C19FM21/E19FM03	Controls and Suspension system	6	90	40/100
C19FM22/E19FM04	Transport Operations And Maintenance Management	6	90	40/100
C19LS23/E19LS05	Life Skill	6	90	40/100
C19FMP2/E19FMP2	Practical II-Automobile Electrical Equipments	4	120	40/100
C19FMPW/E19FMPW	Project	10	150	40/100

Eligibility for admission: Pass in 10thstd examination conducted by the Govt. of Tamil Nadu Board of Secondary Education, Government of Tamil Nadu or any other equivalent examination.

Examination: Passing Minimum for each Course is 40%. Classification will be done on the basis percentage marks of the total marks obtained in all the Courses and as given below:

40 % but less than 50 % - Third class
50 % but less than 60 % - Second class
60 % and above - First class

Theory Paper

Internal Marks-25
External Marks-75

Syllabus

Semester I

Course-I	:	Automotive Engines-I
Course-II	:	Automotive Engines-II
Course-III	:	Transmission system-I
Course -IV	:	Communicative English
Course-V	:	Practical I-Automobile Engines

Semester II

Course-VI	:	Controls and Suspension System
Course-VII	:	Transport Operations and Maintenance Management
Course-VIII	:	Life Skill
Course-IX	:	Practical II-Automobile Electrical Equipments
Course- X	:	Project

***(Semester Pattern for Community College Only)**

Program Objectives

- To make qualified and skilled worker for the four wheeler service and maintenance sector.
- To create an opportunity for the students to have technical Education and increase the employability.

Semester I
Course I
(C19FM11/E19FM01)Automotive Engines-I

Objectives

- To study about fundamentals of Engines and its Types.
- To get knowledge about fuel feed system, cooling system and lubrication system.

Unit I **18 Hrs**

FUNDAMENTALS OF ENGINES

Engine components- functions, types, materials and construction of – cylinder block- crankcase –oil pan- cylinder head- Gaskets- cylinder liners- piston- piston rings- types of compression rings and oil control rings- connecting rod- methods of connecting piston and connecting rod- crankshaft- flywheel- cam shaft- methods of cam shaft drive arrangements- valve and valve mechanism.

Unit II **18 Hrs**

PETROL AND DIESEL ENGINE

Petrol Engines- single and multi cylinder engines- firing order - Detonation- Petrol Knock- Octane number- Anti Knock Fuel. Diesel engine – combustion of diesel fuel- phases of combustion in four stroke engines- dieses knock- cetane number- fuel dopes- Types of diesel engine combustion chamber- engine tune up- High speed Diesel Engines.

Unit III **18 Hrs**

FUEL FEED SYSTEM (PETROL ENGINE)

Petrol fuel feed systems- construction and working of mechanical and electrical fuel feed pumps- fuel filters- Air filters: types- dry type, wet type and oil bath type. Carburetion - principles- simple carburetors- solex carburetor- S.U. carburetor. Inlet and exhaust manifolds - mufflers and silencers-petrol injection - MPFI system - construction and working-merits and demerits.

Unit IV **18 Hrs**

FUEL FEED SYSTEM (DIESEL ENGINE)

Diesel fuel feed system- layout- feed pump.- types-FIP- types- construction and operation – dieses filter- pre-filter and micro filter- water separator- injectors and Nozzles –types , single , multi hole, pintle and pintex type nozzles. Common Rail direct injection (CRDI)- Governors- Mechanical ad pneumatic type – super charging- Turbo chargers.

Unit V **18 Hrs**

COOLING AND LUBRICATION SYSTEM:

Cooling system: types: Air cooling system- water cooling system- comparison- thermo siphon and pump circulation in water cooling system- Pressure sealed cooling system – thermostat- wax pellet and bellow type – water pump- Radiators- cellular and tubular- coolant types- Anti Freeze solution.

LUBRICATION SYSTEM:

Splash – Partial pressure system- full flow and by pass systems- characteristics of lubricating oils- classification and identification of SAE oils- filtering systems- oil strainer- oil pumps- Gear and Rotor type-Construction and operation- pressure relief valve- construction.

REFERENCE BOOKS FOR FOUR WHEELER MECHANISM:

- Internal Combustion Engine Fundamentals, “Heywood.J.B”, McGraw Hill Book Co., 1995.
- Internal Combustion Engines, “Taylor.C.F”, MIT Press, 1972
- Automobiles and Pollution SAE Transaction, 1995
- Automotive electrical equipment, W.H. Crouse, Mc. Graw hill book co. inc. New York Automotive Electronics and Electrical equipment by William H. Crouse and DL. Anglin, McGraw Hill company.
- Automobile Engineering, KM Gupta, Umesh Publishers
- Automobile Engineering, RB Gupta, Satya Prakashan, New Delhi
- Automotive Transmission & Power Train – William H. Grouse.
- Automotive Chassis and Body-William H. Grouse
- Automotive technology- service & maintenance by Don Knowles
- Automotive service by Tim Gills, Delmar Publisher Inc.
- Automotive mechanics by William H Course & Donald L Anglin.
- Service Manuals from Different Vehicle Manufacturers.

Course II
(C19FM12/E19FM02)AUTOMOTIVE ENGINES-II

Objectives

- To study about Automobile Emission and emission control methods.
- To get knowledge about Automobile Electrical system.
- To get knowledge about Auto mobile Tools & Equipments and safety precaution.

Unit I **18 Hrs**

EMISSION FROM AUTOMOBILES

Various emission from Automobiles- Formation –effects of pollutants on environment and human beings – emission formation in SI engines- carbon monoxide- hydrocarbon- Nitric oxide- Lead particulate- Emission from C.I Engine- Emission formation due to incomplete combustion- white, blue and black smokes- particulates- Noise pollution.

Unit II **18 Hrs**

EMISSION CONTROL METHODS

Emission norms- EURO, and India. Controlling of pollutants from engine- catalytic converters- charcoal canister- control for evaporative emission- positive crank case ventilation system for unburnt hydro carbon -emission reduction- EGR (Exhaust gas recirculation)-Air injection – Silencer design on sound reduction in automobiles- Exhaust gas analyzer- smoke meter.

Unit III **18 Hrs**

AUTOMOBILE ELECTRICAL SYSTEM

Definitions- Electric Current, voltage and resistance-Ohm's law and Kirchhoff's law- electromagnetism. Generator, alternator, Regulator and starting motor- purpose, construction and working – ignition system- charging system- lighting system and Auxiliary system- lead acid battery- purpose- construction and working- capacity rating- testing- hydrometer test- open voltmeter test- High rate discharge test- charging methods- trouble shooting in batteries- run down- over charging- sulphation- bulging. Battery coil ignition system- purpose- components and its functions- Distributor, spark plug- types- condenser- breaker point mechanism – Magneto ignition system.

Unit V **18 Hrs**

AUTOMOBILE TOOLS AND EQUIPMENTS

HAND TOOLS: Screw drivers- spanners- wrenches – cutting pliers. Measuring Tools: Steel rule- vernier calipers- micrometers- thickness gauge Servicing Tools: Piston ring expander and compressor- valve spring compressor- valve seat grinder- Air compressor- wheel balancer- torque wrench- jack – tyre changer. Arc welding- gas welding – equipments- working – advantages and disadvantages.

Unit V **18 Hrs**

SAFETY PRECAUTIONS

Safety in arrangement of tools and equipments- safety precautions to be followed while handling of tools- fire- classifications- fire extinguisher- types: foam type, carbon-di-oxide, dry chemicals type. Soda- acid type- applications- safety devices- importance of earthing – electric shock- precautions against shock- first aid: definition- procedures.

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- Automotive Chassis and Body-William H. Grouse
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- Automotive mechanics by William H Course & Donald L Anglin.
- Service Manuals from Different Vehicle Manufacturers.

Course III

(C19FM13/E19FM03)TRANSMISSION SYSTEM-I

Objectives

- To get knowledge about various components of Automobile Transmission system.

Unit I **18 Hrs**

CASSIS, FRAME AND BODY

Introduction - chassis frame- layout of the chassis and its main components- functions of the chassis frame- types of chassis frames- various loads acting on the frame- different bodies used in automobiles- requirements of bodies for various types of vehicles viz. private, commercial etc.

Unit II **18 Hrs**

CLUTCH

Clutch- function- clutch actuating mechanism- Mechanical and hydraulic types- clutch material- single plate dry clutch- dual plate dry clutch – multi-plate wet clutch- semi centrifugal and centrifugal clutch- fluid coupling – trouble shooting of clutch.

Unit III **18 Hrs**

GEAR BOX

Gear box- purpose- resistance offered to the motion of the vehicle – air resistance— rolling resistance- offered to the motion of the vehicle- gradient resistance- types of gear boxes.- sliding mesh- constant mesh- synchromesh device- epicyclic – over drive- under drive and transfer cases- four wheel drive- gear shifting mechanism- floor shifting and steering column shifting- trouble shooting of gear box.

Unit IV **18 Hrs**

UNIVERSAL JOINT AND PROPELLER SHAFT

Universal joints- variable velocity joint- constant velocity joints- cross or spider type- Rzeppa joints- bendix weiss type- tracta- centre joint- construction for heavy vehicles- propeller shaft –construction – types- Hotchkiss, torque tube, torque arms- shackles- types. Maintenance and overhauling of universal joint and propeller shaft.

Unit V **18 Hrs**

FINAL DRIVE AND DIFFERENTIAL

Final drive -function- types – spiral, bevel, hypoid- worm and worm wheel- differential function- differential action- non-slip differential- differential lock- trouble shooting of final drive and differential. Maintenance and overhauling of final drive and differential.

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Course IV

(C19CE10/E19CE10)Communicative English

1. **Basic Grammar**:
   (a) Review of grammar
   (b) Remedial study of grammar
   (c) Simple sentence
   (d) Word passive voice etc.

2. **Bubbling Vocabulary**:
   (a) Synonyms
   (b) Antonyms
   (c) One – work Institution

3. **Reading and Understanding English**
   (a) Comprehension passage
   (b) Précis – writing
   (c) Developing a story from hints.

4. **Writing English**
   (a) Writing Business letters.
   (b) Paragraph writing
   (c) Essay writing
   (d) Dialogue writing

5. **Speaking English**
   (a) Expressions used under different circumstances
   (b) Phonetics

Reference :

1. V.H.Baskaran – "English Made Easy"
2. V.H.Baskaran – "English Composition Made Easy"
   (Shakespeare Institute of English Studies, Chennai)
3. N.Krishnaswamy – "Teaching English Grammar"
   (T.R.Publication, Chennai)
4. "Life Skill" – P.Ravi, S.Prabakar and T.Tamzil Chelvam,
   M.S.University, Tirunelveli.

Course V

Practical I

(C19FMP1/E19FMP1)AUTOMOBILE ENGINES

Objectives

- To identify the various Tools used in Automobile work shop.
- To dismantle service and Assemble of various engine components.
- To study about MPFI & CRDI

LIST OF EXERCISES:

1. Identification and application of Mechanic's Tools.
2. Dismantling, Identification of parts and assembling of Four Stroke Petrol engine.
3. Dismantling, Identification of parts and assembling of Four Stroke Diesel engine.
4. Dismantling, Servicing and assembling of Fuel Feed pump in Petrol Engine.
5. Dismantling, Servicing and assembling of Fuel Feed pump in Diesel Engine.
6. Engine Oil Changing and Replacement of Oil Filters.
7. Dismantling, Servicing and Tuning of Solex Carburetor.
8. Dismantling, Servicing and assembling of Fuel Injection Pump.
9. Dismantling, Servicing and assembling of Fuel Injector.
10. Study of Multi Point Fuel Injection(MPFI) and Common Rail Direct Injection (CRDI) System.

Semester II
Course VI
(C19FM21/E19FM03)Controls and Suspension System

Objectives

- To get knowledge about suspension system and its components.
- To study about steering system and braking system.
- To accure knowledge about Wheels, Tyre & Tubes.

Unit I **18 Hrs**

FRONT AND REAR AXLE

Front axle construction- live and dead axle- beam and tubular construction- stub axle types- Elliot and reverse Elliot- Lemoine and Lemoine inverted- rear axle construction- floating axles- semi- floating- three quarter floating and full floating. Wheel alignment-and wheel balancing. Maintenance and overhauling of front and rear axle.

Unit II **18 Hrs**

STEERING SYSTEM

Steering system- Ackerman principle of steering- front end geometry- castor, camber, kingpin inclination. Toe-in, toe-out - steering gear box- types- - power steering-construction and working linkage\-types- power steering pumps- Overhauling and maintenance.

Unit III **18 Hrs**

BRAKING SYSTEM

Brakes- function- stopping distance- braking system- mechanical, hydraulic and air brake systems- brake shoes, primary and secondary shoes-drum and disc brakes- construction and operation- maser cylinder- single and Tandem master cylinder – wheel cylinders- bleeding of brakes- brake shoe adjustment mechanism- ABS- Maintenance and overhauling of braking systems.

Unit IV **18 Hrs**

SUSPENSION SYUSTEM

suspension system- rigid axle and independent suspension- function of spring and shock absorber- independent suspension- coil, leaf spring, torsion bar and air suspension system- rear independent suspension- antiroll bar- shock absorber types – trouble shooting in suspension systems.

Unit V **18 Hrs**

WHEEL, TYRES AND TUBES

Tyres and tubes- cross ply and radial ply- tubeless tyres- wheels- types- disc, split type, spoked and magna- maintenance and servicing of wheel, tyres and tubes.

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- Internal Combustion Engine Fundamentals, “Heywood.J.B”, McGraw Hill Book Co., 1995.
- Internal Combustion Engines, “Taylor.C.F”, MIT Press, 1972
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Course VII
(C19FM22/E19FM04)TRANSPORT OPERATIONS AND MAINTENANCE MANAGEMET

Objectives

- To study about Goods & Passenger Transport operation
- To study about the Motor vehicle act and Road signals.
- To get the knowledge about vehicle maintenance.

Unit I **18 Hrs**

Introduction to Transport Management and system: Transportation-Meaning-importance and functions-Developments of Transport in India-Challenges faced by Indian Transport system-Modes of Transport-Air-land-water-Elements and components of Transport-Transport fore casting.

Unit II **18 Hrs**

Goods Transport Operation: Layout of garages and depots - materials handling equipments in the goods vehicle depot-Receipt of goods, delivery of goods, insurance of goods and vehicles-settlement of claims-drivers duty schedules - vehicles schedule, log sheet-way bills and other documents.

Unit III **18 Hrs**

Passenger Transport Operation: Administrative set up of a passenger transport organization, traffic investigation to improve services – peak hour demands – classification of vehicles – express, limited stop, relief services, etc. – Fare table calculation – vehicle schedule in city service – drivers and conductors duty schedules – ticket system- trip sheet.

Unit IV **18 Hrs**

Motor Vehicles Act, Road Signals: Definition of vehicles permit – insurance, road tax, etc. – procedure for registering a vehicle – fitness certificate– inspection of accidents and recording – issue of driving license and conductor license – enforcement of emission norms –Road signals and their meanings.

Unit V **18 Hrs**

Vehicle Maintenance: Necessity of maintenance, types of maintenance- preventive maintenance system, scheduled maintenance system and breakdown maintenance system- General maintenance schedule- daily, weekly, monthly and periodic maintenance of various vehicles -General automotive service procedure-maintenance of records used in automobile workshops.

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- Internal Combustion Engine Fundamentals, “Heywood.J.B”, McGraw Hill Book Co., 1995.
- Internal Combustion Engines, “Taylor.C.F”, MIT Press, 1972
- Automobiles and Pollution SAE Transaction, 1995
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Course VIII

(C19LS23/E19LS05)Life Skill

I Life Coping or adjustment

a) External and internal influence in one's life
b) Process of coping or adjustment
c) Coping with physical change and sexuality
d) Coping with stress, shyness, fear, anger far live and criticism.

II Attitude

a) Attitude
b) Self acceptance, self – esteem and self actualization
c) Positive thinking

III Problem Solving

a) Goal Setting
b) Decision Making
c) Time Management and stress Management.

IV Computers

a) Introduction to Computers
b) M.S.Office
c) Power Point

V Internet

a) Introduction to internet
b) E – mail
c) Browsing

References:

1. Life Skill Programme course I & II by Dr. Xavier Alphona MCRDCE Publications. R.K.Mutt Road, Chennai – 28
2. ஆளுமை பண்பு வளர்த்தல் மற்றும் தகவல் தொடர்பு by M.Selvaraj Community College,Palayamkottai
3. "Life Skill" –P.Ravi, S.Prabahar & T.Tamil Chelvam, M.S. University, Tirunelveli

Course IX

Practical II

(C19FMP2/E19FMP2)AUTOMOBILE ELECTRICAL EQUIPMENTS

Objectives

- To identify the various electrical Tools & Equipments used in Automobiles.
- Ability to Dismantling, servicing and Assembling of various Electrical Components used in Automobiles.
- Ability to Trace out the faults of the Electrical wiring system.

LIST OF EXERCISES:

1. Battery Removing, Testing and Charging.
2. Dismantling, Overhauling and assembling of Alternator.
3. Dismantling, Overhauling and assembling of Starter Motor.
4. Dismantling, Servicing and assembling of Distributor.
5. Spark Plug Cleaning and adjusting the Spark gap.
6. Setting of Ignition Timing.
7. Servicing of Electrical Horn.
8. Adjusting and Aiming the head lamp
9. Servicing of wiper motor.
10. Trouble shooting of Dashboard electrical system.
11. Tracing and fault finding of electrical wiring for lighting system.

Course X

(C19FMPW/E19FMPW) Project
