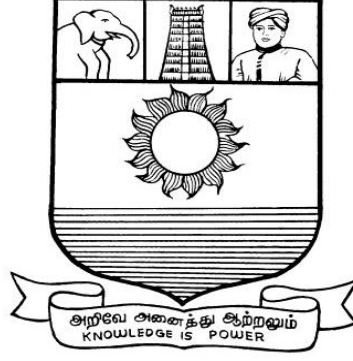


மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்  
திருநெல்வேலி – 627 012

**Manonmaniam Sundaranar University  
Thirunelveli – 627 012.**



கல்விசார் நிலைக்குழுக் கூட்டம்

**MEETING OF THE STANDING COMMITTEE ON  
ACADEMIC AFFAIRS HELD ON FRIDAY  
THE 27<sup>th</sup> OCTOBER 2017.**

**Syllabus for Diploma in Heavy Vehicle Mechanism Course  
offered through Directorate of Vocational Education  
(Community Colleges and Extension Learning Programme)  
from 2017 – 2018**

**DIPLOMA IN HEAVY VEHICLE MECHANISM**  
**SCHEME OF EXAMINATION**

Subject Code	Title of the Paper	Credit	Hours	Passing Minimum
<b>Semester-I</b>				
C17HV11/E17HV01	I.C Engine	6	90	40/100
C17HV12/E17HV02	Vehicle Transmission System	6	90	40/100
C17HV13/E17HV03	Steering And Braking System	6	90	40/100
C17CE10/E17CE10	Communicative English	6	90	40/100
C17HVP1/E17HVP1	Practical paper-I Heavy Motor Vehicle Repair And Maintenance	6	90	40/100
<b>Semester-II</b>				
C17HV21/E17HV04	Suspension System, Wheels And Tyres	6	90	40/100
C17HV22/E17HV05	Transport Operations And Maintenance Management	6	90	40/100
C17LS23/E17LS05	Life Skill	6	90	40/100
C17HVP2/E17HVP2	Practical Paper-II Vehicle Electrical System	6	90	40/100
C17HVPW/E17HVPW	Project	6	90	40/100

**Eligibility for admission:** Pass in 12thStd 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 paper is 40%. Classification will be done on the basis percentage marks of the total marks obtained in all the papers and as given below:

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

**Syllabus**

**FIRST SEMESTER**

Paper-I	: I.C Engine
Paper-II	: Vehicle Transmission System
Paper-III	: Steering And Braking System
Paper -IV	: Communicative English
Paper-V	: Practical paper-I Heavy Motor Vehicle Repair And Maintenance

**SECOND SEMESTER**

Paper-VI	: Suspension System, Wheels And Tyres
Paper- VII	: Transport Operations And Maintenance Management
Paper-VIII	: Life Skill
Paper-IX	: Practical Paper-II Vehicle Electrical System
Paper- X	: Project

## **HEAVY VEHICLE MECHANISM**

### **(C17HV11/E17HV01) Paper1: I.C Engine**

#### **UNIT- I BASICS OF ENGINE**

Engine: Types of IC engines –working principle- Constructional details of Heavy vehicles-Cylinder block, cylinder head, piston, piston rings, connecting rod, crank shaft, main bearing, cam shaft, valves, cylinder liners, gasket, crankcase, Oil pan, Manifold, vibration damper, flywheel.

#### **UNIT- II COOLING AND LUBRICATION SYSTEM**

Heavy vehicle engine cooling system–necessity-Components of cooling system- Water cooling system- types -Antifreeze solutions.

Lubrication system–necessity-components of lubrication system-Types of Lubricant-oil filter-oil pump-types-construction and working -Crankcase ventilation-chassis lubrication.

#### **UNIT- III FUEL SUPPLY SYSTEM**

Fuel injection system-components of fuel injection system-Fuel injection pump-types-Jerk, distributor type-construction and working- Fuel injector-types-multi-hole, pintile, pintax- construction and working-Governor-types-Mechanical, Hydraulic and pneumatic-construction and working- Cold starting device-Supercharging and turbo charging of diesel engine.

#### **UNIT- IV EMISSION AND EMISSION CONTROL**

Emission control-effect of emission for atmosphere-Reduction of pollutants formation-Closed crank case ventilation -Changes in fuel supply system- Exhaust gas analysis- catalytic converter-exhaust gas recirculation system-emission standards -BS-I, BS-II, BS-III, BS-IV.

#### **UNIT- V TROUBLE SHOOTING OF IC ENGINES**

Troubles in wet liners - Piston failures-Causes of ring failures-Valves troubles-Lubrication system trouble shooting-Fuel supply trouble shooting-Turbocharger and super charger trouble shooting.

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### **(C17HV12/E17HV02)Paper- II: VEHICLE TRANSMISSION SYSTE**

#### **UNIT- I CLUTCH**

Clutch-principle of friction clutches- Clutch types - Clutch Operation-Mechanical-Hydraulic operation-Clutch components-Clutch adjustment.

#### **UNIT -II GEAR BOX**

Necessity of gear box-Types of Gear boxes- Sliding Mesh Gear box-Constant mesh gear box-Double declutching-Synchromesh Gear box-construction and working-Lubrication of Gears- Selector mechanism-Transfer box.

### **UNIT- III AUTOMATIC GEAR BOX**

Automatic transmission- Principle of Automatic transmission- Epicyclical Gear box-Free wheel unit-Torque converter -Over drive.

### **UNIT- IV PROPELLER SHAFT AND DIFFERENTIAL**

Propeller shaft-Universal joint-Final drive -Differential-Rear axle types-semi floating, three quarter floating, full floating-Rear axle drive types- Hotchkiss drive, Torque tube Drive.

### **UNIT- V TROUBLE SHOOTING OF TRANSMISSION SYSTEM**

Clutch trouble shooting-Fluid flywheel trouble shooting-Gear box trouble shooting-Propeller shaft trouble shooting-Rear axle trouble shooting-Differential trouble shooting.

## **(C17HV13/E17HV03)PAPER-III STEERING AND BRAKING SYSTEM**

### **UNIT-I FRONT AXLE AND STEERING SYSTEM**

Front axle types-Components of front axle-stub axle and its types- layout of Steering system -components of steering system-Types of steering Gears-Steering linkage-Steering Ratio-Steering geometry- Ackermann steering mechanism.

### **UNIT-II POWER STEERING AND WHEEL BALANCING**

Power steering-components of power steering- types of power Steering: integral type, linkage booster type-Wheel balancing-static and dynamic balancing -Backlash in steering Gear and its Adjustment-Steering adjustments.

### **UNIT -III BRAKING SYSTEM**

Necessity of brakes-Principle of braking system-Brake system components and layout-Classification of Brakes-Drum brake, air brake- components and working -Engine exhaust brake- Hand brake-Anti lock brake system.

### **UNIT- IV HYDRAULIC BRAKING SYSTEM**

Hydraulic brake System: layout and its Components-master cylinder: tandem master cylinder-wheel cylinder-types of wheel cylinder-brake booster-bleeding of hydraulic braking system.

### **UNIT V TROUBLE SHOOTING OF STEERING AND BRAKING SYSTEM**

(C17CE10/E17CE10) **Paper IV Communicative English**

**Unit I: Learning context**

Concept of learning – Learning style –Grammatical framework – sentence framing – paragraph and texts

**Unit II: Reading**

Basic concept – Purposes of reading-Decoding-Reading materials – Barriers of reading

**Unit III: Writing**

Basic concept-Writing style-Terminology-stages-English spelling and punctuation – Written texts

**Unit IV: Speaking**

Language functions-Conversation- Features of spoken English – Types of English course: functional English, English literature, advance English – Phonetic

**Unit V: Developing Communication Skills**

Meaning –Classroom presence- Features of developing learning process- Practical skills and Listening- uses of communicative English

**References Books:**

1. Raman, m.&S. Sharma (2011) communication skills, OUP,New Delhi: India
2. Lata, P.&S. Kumar(2011) communication skills, OUP,New Delhi: India,
- 3.Leech,G&J.Svartvik(2002) A communicative grammar of English, Pearson,India,
4. Sethi, J. and P.V. Dharmija (2007) A course in Phonetics and spoken English. Second edition, Prentice hall: New Delhi

**PAPER-V - Practical**

(C17HVP1/E17HVP1) **Heavy motor vehicle repair and maintenance**

**UNIT -I**

Operation of air compressor – Operation of grease gun- Oil spray wash and cleaning of vehicle – Vehicle greasing – Engine oil check up and topping –

Identification of engine parts – Engine maintenance according to manufacturer specification.

## **UNIT II**

Overhauling cylinder head assembly – checking flatness of surface by straight edge and feeler gauge –over hauling piston and connecting rod assembly – checking of bend in crankshaft, bend in camshaft ,Cylinder block flatness, bore taper and ovality- fitting of liner and piston -over hauling oil pump, oil cooler – overhauling water pump and testing thermostat valve.

## **UNIT III**

Over hauling clutch – servicing radiator -overhauling fuel feed pump- Inspection of fuel pump – over hauling Injectors – Assembling engine – Rectify causes for engine over heating- high fuel consumption low engine oil pressure- low power generation- mechanical causes

## **UNIT IV**

Gearbox dismantling and assembling-Final drive, gear sun and star gear mating checking, brake adjustment, brake lining checking-brake shoe checking-leaf crack checking, U-clamp checking- Oil change for engine, gearbox, and rear axle-Turbocharger servicing.

## **UNIT V**

Safety in the heavy vehicle shop –Measuring system and measuring tools – Shop hand tools – shop equipment and power tools.

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## **(C17HV21/E17HV04) PAPER –VI SUSPENSION SYSTEM, WHEELS AND TYRES**

### **UNIT –I FRONT SUSPENSION**

Suspension system – components of suspension system-leaf spring suspensions - spring pack principle – spring pack self damping – types of leaf spring assemblies-front suspension.

### **UNIT II REAR SUSPENSION**

Rear suspension-single axle – Rear suspension Tandem axle –Bogie suspension –spring suspension with shock absorbers – spring suspension with torque rod –Equalizing beam suspensions – leaf spring equalizing beam

– fibre composite leaf springs – solid rubber spring equalizing beam –Torsion bar suspensions.

### **UNIT- III AIR SUSPENSION AND SHOCK ABSORBER**

Air suspension features- Air suspension components- height control valve-regulator- air springs- shock absorbers- purpose- operations-types of shock absorbers- fifth wheel and coupling system – type of fifth wheels.

### **UNIT- IV WHEELS AND TYRES**

Tyre types-Tyre construction-Bias and Radial Plies-Tyre pressure monitoring-Tyre size- sidewall markings-Speed rated tyres-Tyre grading-Tubes. Wheels-Cast- spoke wheels-Disc wheels–Piloted wheel-Hub-Piloted Wheel-Wide -Base Wheels.

### **UNIT V TROUBLE SHOOTING OF SUSPENSION AND TYRES**

Leaf spring suspension Trouble shooting- rough ride diagnosis - air suspension inspection- rough ride check list- tyre inspection- mechanical irregularities – causes of tyre wear – tyre rotation and replacement – tyre and rim safety –rim inspection – Inflation –wheel and tyre trouble shooting .

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## **PAPER-VII**

### **(C17HV22/E17HV05) TRANSPORT OPERATIONS AND MAINTENANCE MANAGEMET**

**Unit I: 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 II: 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 III: 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 IV: 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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**(C17LS23/E17LS05) PAPER VIII (LIFE SKILL)**

**(Common to All Courses)**

**UNIT-I ATTITUDE :** Positive thinking – Goal setting – Problem Solving and Decision making – Leadership and Team Work.

**UNIT-II COMMUNICATION SKILLS:** Oral communication: Concept of English language – Fluency – Verbal communication in official and public situations.

**UNIT-III COMMUNICATION SKILLS:** Written Communication: Comprehension – Writing a formal letter like application for Job, enquiry, reply, complaint and such others – preparation of Resume, Curriculum Vitae.

**UNIT-IV COMPUTING SKILLS – 1:** Introduction to Computers, its various components and their respective functions – Memory storage devices – Microsoft (MS) Office – MS Word.

**UNIT-V COMPUTING SKILLS – 2** Internet Basics – Origin of Internet – MODEM – ISP – Upload – Download – e-mail – Origin of worldwide web (www) Browsers – Search engines.

Reference books:

Life skill, Manonmaniam Sundaranar University Publications Division (2011)

**PAPER-IX – Practical**

**(C17HVP2/E17HVP2) VEHICLE ELECTRICAL SYSTEM**

**UNIT – I**

Lighting circuits of MAN, VOLVO and other vehicles-Joining, crimping and soldering of wires –ECU circuits-Types of sensors in MAN ,VOLVO and other vehicles-trouble shooting in ECU and Sensor system -Circuit connection methods of ECU .



## **UNIT - II**

Serial and parallel circuits - Measuring voltage, current and resistance-  
Checking resistance in the rotor winding (alternator) circuit-Checking dash  
board units.

## **UNIT III**

Battery servicing and troubleshooting- Ignition system-Electronic Ignition  
system and troubleshooting.

## **UNIT IV**

Over hauling alternator and starting motor-trouble shooting in alternator  
and starting motor.

**Unit V** Electrical trouble shooting for engine not starting.

### **(C17HVPW/E17HVPW) Paper X Project**

## **REFERENCE BOOKS FOR FOUR WHEELER MECHANISM:**

- 1 Internal Combustion Engine Fundamentals, "Heywood.J.B", McGraw Hill Book Co., 1995.
- 2 Internal Combustion Engines, "Taylor.C.F", MIT Press, 1972
- 3 Automobiles and Pollution SAE Transaction, 1995
- 4 Automotive electrical equipment, W.H. Crouse, Mc. Graw hill book co. inc. New York
- 5 Automotive Electronics and Electrical equipment by William H. Crouse and DL. Anglin, McGraw Hill company.
- 6 Automobile Engineering, KM Gupta, Umesh Publishers
- 7 Automobile Engineering, RB Gupta, Satya Prakashan, New Delh
- 8 Automotive Transmission & Power Train – William H. Grouse.
- 9 Automotive Chassis and Body-William H. Grouse
- 10 Automotive technology- service & maintenance by Don Knowles

11 Automotive service by Tim Gills, Delmar Publisher Inc.

12 Automotive mechanics by William H Course & Donald L Anglin.

13 Service Manuals from Different Vehicle Manufacturers.

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