



PM POLYTECHNIC

A Unit of Puran Murti Educational Society
Approved by AICTE, Ministry of HRD, Govt. of India,
Affiliated to State Board of Technical Education, Panchkula, Haryana

SCHEME FOR THIRD SEMESTER (AUTOMOBILE ENGINEERING)

Sr. No.	Subject	Study Scheme			EVALUATION SCHEME						Total Marks
					INTERNAL ASSESSMENT		EXTERNAL ASSESMENT (EXAMINATION)				
					Theory	Practical	Written Paper		Practical		
					Max. Marks	Max. Marks	Max. Marks	Hrs.	Max. Marks	Hrs.	
3.1*	Strength of Materials	4	-	2	25	25	100	3	50	2	200
3.2	Element of Mechanical Engineering	4	-	-	25	-	100	3	-	-	125
3.3*	Basis of Electrical & Electronics Engineering	3	-	2	25	25	100	3	50	2	200
3.4	Manufacturing Technology-1	4	-	4	25	25	100	3	50	3	200
3.5	Automobile Engineering Drawing	-	-	6	-	50	100	3	25 (Viva)	2	175
3.6	Automobile Workshop	-	-	6	-	50	-	-	100	3	150
	#Student Centered Activities	-	-	5	-	25	-	-	-	-	25
	Total	15	-	25	100	200	500	-	275	-	1075

* Common with other diploma programmers

+ Includes 25 marks for Viva-voce

Student Centered Activities will comprise of co-curricular activities like extension lectures, library studies, games, Hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C.,NSS, Cultural Activities, Civil Defense/Disaster Management activities etc.



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SYLLABUS: Polytechnic (AE)

Department: Automobile Engineering – 3rd Semester

Subject: Strength of Material (Theory)

Subject Code: 120331

Detailed Contents

Unit No. 1 Stresses and Strains

- Topic No.1: Concept of load, stresses and strain, Tensile compressive and shear stresses and strains
- Topic No.2: Concept of Elasticity, Elastic limit and limit of proportionality.
- Topic No.3: Hook's Law, Young Modulus of elasticity, Nominal stress
- Topic No.4: Stress strain diagram, Yield point, plastic stage, Ultimate strength and breaking stress
- Topic No.5: Proof stress and working stress, Factor of safety, Poisson's ratio, Shear modulus
- Topic No.6: Longitudinal and circumferential stresses in seamless thin walled cylindrical shells (derivation of these formulae not required)

Unit No. 2 Resilience

- Topic No.7: Resilience, proof resilience and modulus of resilience, Strain energy due to direct stresses
- Topic No.8: Stresses due to gradual, sudden and falling load.
- Topic No.9: Numerical problems

Unit No. 3 Moment of Inertia

- Topic No.10: Concept of moment of Inertia and second moment of area, Radius of gyration, section modulus
- Topic No.11: Theorem of perpendicular axis and parallel axis (without derivation):
- Topic No.12: Second moment of area of common geometrical sections: Rectangle, Triangle and Circle (without derivation) Second moment of area for I, T
- Topic No.13: Simple numerical problems.

Unit No. 4 Bending Moment and Shearing Force

- Topic No.14: Concept of beam and type of loading, Concept of end supports-Roller, hinged and fixed
- Topic No.15: Concept of bending moment and shearing force
- Topic No.16: B.M. and S.F. Diagram for cantilever and simply supported beams with and without overhang subjected to concentrate and U.D.L

Unit No. 5 Bending stresses

- Topic No.17: Concept of Bending stresses , Theory of simple bending
- Topic No.18: Use of the equation $f/y = M/I = E/R$, Concept of moment of resistance
- Topic No.19: Bending stress diagram, Calculation of maximum bending stress in beams of rectangular, circular, and T section.
- Topic No.20: Permissible bending stress Section modulus for rectangular, circular and symmetrical I section

Unit No. 6 Columns

- Topic No.21: Concept of column, modes of failure, Types of columns
- Topic No.22: Buckling load, crushing load, Slenderness ratio
- Topic No.23: Factors effecting strength of a column, End restraints, Effective length
- Topic No.24: Strength of column by Euler Formula without derivation

Unit No. 7 Torsion

- Topic No.25: Concept of torsion- difference between torque and torsion. Use of torque equation for circular shaft
- Topic No.26: Comparison between solid and hollow shaft with regard to their strength and weight
- Topic No.27: Power transmitted by shaft, Concept of mean and maximum torque

Unit No. 8 Springs

- Topic No.28: Closed coil helical springs subjected to axial load and impact load, Stress deformation
- Topic No.29: Stiffness and angle of twist and strain energy, Proof resilience
- Topic No.30: Laminated spring (semi elliptical type only), Determination of number of plates



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STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
4	-	-	25	-	100	3	-	-	125

RECOMMENDED BOOKS

1. SOM by Birinder Singh,; Katson Publishing House, New Delhi.
2. SOM by RS Khurmi; S.Chand & Co; New Delhi
3. Elements of SOM by D.R. Malhotra & H.C.Gupta; Satya Prakashan, New Delhi..

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	12
2	06	10
3	06	10
4	10	16
5	08	12
6	08	12
7	08	12
8	10	16
Total	64	100



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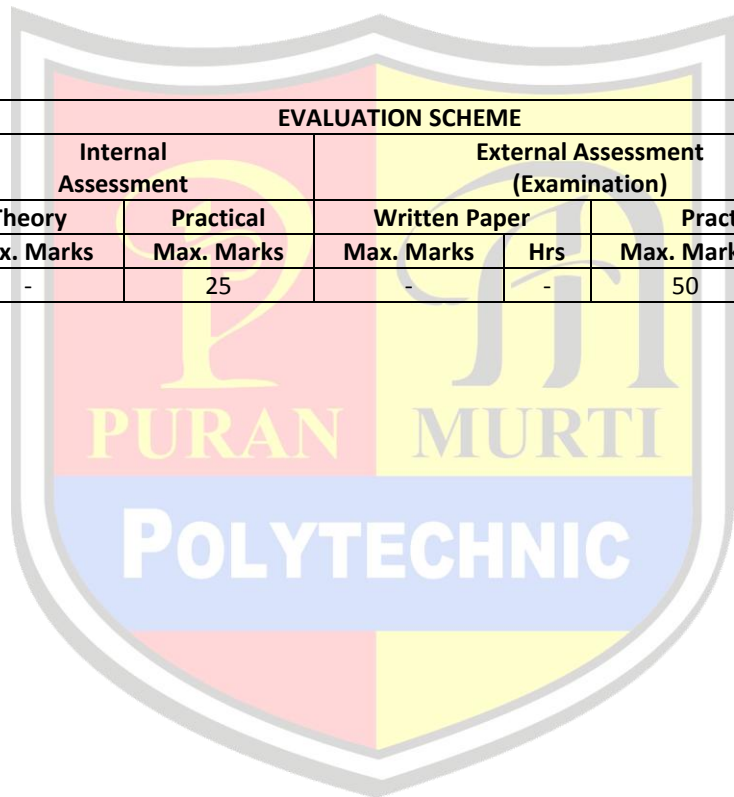
Subject: Strength Of Materials (Practical)

Subject Code: 120331(P)

List of Practicals

- 1: Tensile test on bars of Mild steel and Aluminum.
- 2: Bending tests on a steel bar or a wooden beam.
- 3: Impact test on metals
 - a) Izod test
 - b) Charpy test
- 4: Torsion test on specimens of different metals for determining modulus of rigidity.
- 5: To determine the stiffness of a helical spring and to plot a graph between load and extension.
- 6: Hardness test on different metals.

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	2	-	25	-	-	50	2	75





Subject: Elements Of Mechanical Engineering (Theory)

Subject Code: 120332

Detailed Contents

Unit No.1 Introduction

Topic No.1: Fluids and non-fluids, Liquid, gas and vapour

Topic No.2: Properties of fluids: Mass density, specific weight, pressure, specific volume, specific

Topic No.3: gravity, viscosity, compressibility, vapour pressure, surface, tension, capillarity

Unit No.2 Fluid statics

Topic No.4: Pascal's law, Concept of pressure: atmospheric pressure, gauge pressure, vacuum, absolute pressure

Topic No.5: Pressure head, Measurement of pressure: Single tube manometer

Topic No.6: U - tube manometer, Differential manometer, bourdon gauge

Unit No.3 Flow of Fluids

Topic No.6: Types of fluid flow: steady and unsteady, uniform and non - uniform, laminar and turbulent

Topic No.7: Rate of flow and its units, Continuity equation of flow

Topic No.8: Bernoulli's theorem (without proof) and its applications, Simple problems

Unit No.4 Hydraulic Devices

Topic No.9: Description, operation and application of hydraulic machines – hydraulic ram, hydraulic jack, hydraulic brake

Topic No.10: hydraulic accumulator, hydraulic press, reciprocating pump, centrifugal pump,

Unit No.5 Thermal Engineering (Introduction)

Topic No.12: Energy, work and heat, Thermodynamic state and system, boundary, surrounding, universe

Topic No.13: Types of thermodynamic systems: closed, open, isolated, adiabatic, Thermodynamic properties pressure, volume, temperature, enthalpy, internal energy .

Topic No. 14: p-v diagram, T-s diagram

Unit No.6 Gas Laws

Topic No.15: Boyle's law, charle's law, joule's law,

Topic No.16: Characteristics equation, gas constant, universal gas constant

Unit No.7 Law of Thermodynamics

Topic No.17: Zeroth, first and second law of thermodynamics (concept only).

Topic No.18: Constant volume, constant pressure, isothermal, hyperbolic, adiabatic, polytropic throttling and free expansion processes

Unit No. 8 Air Cycles (without derivation)

Topic No.19: Carnot cycle, Otto cycle

Topic No.20: Diesel cycle, Dual combustion cycle

Unit No.9 Fuels and Combustion

Topic No.21: Definition of fuel, Types of Automotive fuels, Properties of fuel, Calorific value, Fuel combustion

Topic No.22: Air requirement for complete combustion of fuel, Analysis of exhaust gases with the help of electronic

Unit No. 10 Air Compressor

Topic No.23: Reciprocating air compressor: Working of single stage and double stage, compressor and applications

Topic No.24: Working of super charger and turbo charger

Unit No. 11 Introduction to air conditioning system

Topic No.25: Components of automobile air conditioning system and their function

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
4	-	-	-	25	100	3	-	-	



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Recommended Books

1. Hydraulics and Hydraulic Machines by RS Khurmi; S. Chand & Co. Ltd., New Delhi.
2. Hydraulics and Fluid Mechanics by Jagdish Lal; Metropolitan Book Company Ltd., Delhi.
3. Fluid Mechanics, Hydraulics and Hydraulic Machines by K.K. Arora; Standard Publishers Distributors, Delhi.
4. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi
5. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi
6. Basic Thermodynamics by PB Joshi and US Tumne; Pune Vidyarthi Grah Prakashan
7. Engineering Thermodynamics by CP Arora; Tata McGraw Hill, Delhi

Suggested Distribution of Marks

Topic No.	Time Allotted (Hrs)	Marks Allotted(%)
1	04	06
2	06	10
3	08	12
4	08	12
5	06	10
6	04	05
7	06	10
8	06	10
9	06	10
10	06	10
11	04	05
Total	64	100





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Subject: Basics of Electrical and Electronics Engineering (Theory)

Subject Code: 120136

Detailed Contents

Unit No.1 Application and Advantage of Electricity

- TopicNo.1: Difference between ac and dc
- TopicNo.2: Various applications of electricity
- TopicNo.3: Advantages of electrical energy over other types of energy

Unit No.2 Basic Electrical Quantities

- TopicNo.4: Definition of voltage with their units, name of instruments used for measuring
- TopicNo.5: Current with their units, name of instruments used for measuring
- TopicNo.6: Power with their units, name of instruments used for measuring
- TopicNo.7: Energy with their units, name of instruments used for measuring

Unit No.3 Electromagnetic Induction

- TopicNo.8: Production of e.m.f.
- TopicNo.9: Idea of a transformer and its working principle

Unit No.4 Transmission and Distribution System

- TopicNo.10: Key diagram of 3 phase transmission and distribution system,
- TopicNo.11: Brief functions of accessories of transmission line.
- TopicNo.12: Difference between high and low voltage distribution system
- TopicNo.13: Identification of three-phase wires, neutral wire and earth wire in a low voltage Distribution system.
- TopicNo.14: Identification of voltages between phases and between one phase and Neutral.
- TopicNo.15: Difference between three-phase and single-phase supply.
- TopicNo.16: Arrangement of supply system from pole to the distribution board
- TopicNo.17: Function of service line
- TopicNo.18: Energy meter
- TopicNo.19: Main switch
- TopicNo.20: Distribution board

Unit No.5 Domestic Installation

- TopicNo.21: Various types of domestic circuits,
- TopicNo.22: Various accessories and parts of domestic electrical installation.
- TopicNo.23: Identification of wiring systems,
- TopicNo.24: staircase installation

Unit No.6 Electric Motors and Pumps

- TopicNo.25: Definition and various applications of single-phase and three-phase motors.
- TopicNo.26: Connection and starting of three-phase induction motor by star-delta starter.
- TopicNo.27: Conversion of horse power in watts or kilowatts
- TopicNo.28: Type of pumps and their applications
- TopicNo.29: Difference between direct online starter and star delta starter
- TopicNo.30: Characteristics and applications of servo motors

Unit No.7 Electrical Safety

- TopicNo.31: Electrical shock and precautions against shock
- TopicNo.32: Treatment of electric shock
- TopicNo.33: Concept of fuses and their classification
- TopicNo.34: Selection and application
- TopicNo.35: Concept of earthing
- TopicNo.36: Various types of earthing
- TopicNo.37: Applications of MCBs and ELCBs

Unit No.8 Basic Electronics

- TopicNo.38: Basic idea of semiconductors – P and N type
- TopicNo.39: Diodes, Zener diodes and their applications



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TopicNo.40: Transistor – PNP and NPN, symbols, identification of terminals of Transistor

TopicNo.41: Current flowing in a transistor

TopicNo.42: Its characteristics and uses.

TopicNo.43: Characteristics and applications of a thyristor

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
3	-	-	25	-	100	3	-	-	125

TEXT BOOKS:

1. Basic Electricity by BR Sharma; Satya Prakashan, New Delhi
2. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
3. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi

RECOMMENDED BOOKS

1. Basic Electrical Engineering by PS Dhogal; Tata McGraw Hill Publishers, New Delhi
2. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New Delhi
3. Basic Electronics by VK Mehta; S Chand and Co., New Delhi
4. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	04	10
2	04	10
3	04	10
4	08	15
5	08	15
6	10	18
7	04	10
8	06	12
Total	48	100



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Subject: Basics of Electrical and Electronics Engineering (Practical)

Subject Code: 120136(P)

List of Practical

- 1: Connection of a three-phase motor and starter with fuses and reversing of direction of rotation
- 2: Connection of a single-phase induction motor with supply and reversing of its direction of rotation
- 3: To test a battery for its charged and discharged condition
- 4: Identify the different faults in a domestic wiring system
- 5: Connection and reading of an electric energy meter with supply and load using ammeter, voltmeter, and wattmeter
- 6: Study of a distribution board for domestic installation
- 7: .Ohm's law verification
- 8: Verification of law of resistance in series
- 9: Verification of law of resistance in series
- 10: Draw V-I characteristics of P-N junction diode
- 11: Draw input and output characters of a transistor
- 12: Draw reverse break down characteristics of a zener diode

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	2	-	25	-	-	50	-	75



Detailed Contents

Unit No. 1 Fitting

Topic No.1: Fits, limits and tolerances

Topic No.2: unilateral and bilateral tolerances, gauges, gauge tolerances, micrometer vernier,

Topic No.3: Metal cutting, metal shear, metal sawing, metal bending

Unit No. 2 Metallic and Non-metallic Coatings

Topic No.4: Necessity of metallic and non-metallic coatings,

Topic No.5: electroplating, galvanizing, vacuum zing, metal spraying, painting and their

Topic No.6: Uses of primers, paints and finish coatings, powder coating and its advantages applications

Unit No. 3 Foundry

Topic No.7: Introduction, types of patterns, pattern materials, cores and core boxes, core materials

Topic No.8: Introduction to moulding, types of moulding, types of moulds

Topic No.9: cores, defects in moulds and their remedies,

Topic No.10: casting defects and their remedies

Unit No. 4 Lathe

Topic No.11: types of lathes, specifications, description and functions of lathe parts mechanism,

Topic No.12: Lathe operations – plain turning, facing, centering, parting off, undercutting, taper turning,

Topic No.13: Introduction to capstan and turret lathes, between capstan and turret lathes

Unit No. 5 Shaper

Topic No.14: Operation and mechanism

Unit No. 6 Inspection Instruments and Gauges

Topic No.15: Height gauge, depth gauge, bore gauge, slip gauge, sine bar

Topic No.16: Go and Not-Go gauges,

Topic No.17: screw thread micrometer, thread gauge, radius gauge, dial gauge, and gear tooth vernier

Topic No.18: coating thickness checking instruments, surface finish checking instruments

Topic No.19: Quality Control, concept of control chart

STUDY SCHEME		EVALUATION SCHEME						Total Marks
		Internal Assessment		External Assessment (Examination)				
Hrs/week		Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs
4	-	-	-	25	100	3	-	-
								125

RECOMMENDED BOOKS

1. Workshop Technology by BS Raghuwanshi, Dhanpat Rai & Sons, Delhi
2. Elements of Workshop Technology by SK Choudhary & Hazara, Asia Publishing House
3. Principles of Foundry Technology by Jain, Tata McGraw Hill, New Delhi
4. Workshop Technology, Vol-I, II & III by Chapman, Standard Publishers Distributors, new delhi

SUGGESTED DISTRIBUTION OF MARKS

Unit No.	Time Allotted for Lectures (Periods)	Marks Allotted (%)
1	12	18
2	12	18
3	12	18
4	12	18
5	04	10
6	12	18
Total	64	100



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Subject: Manufacturing Technology-I (Practical)

Subject Code: 120344(P)

DETAILED CONTENTS

List of Practical

Fitting shop

1. Bench work and fittings; simple male-female fitting (fitting of pulley, bearings, gears on shafts), scraping, pipe fittings with leak proof joints, checking alignment and centre distance

Pattern making and foundry shop

1. To prepare pattern of rectangular block, 'V' block, step pulley with core box, split pattern
2. Preparation of open floor mould of solid pattern, cope drag mould using split pattern
3. Visit to foundry to see castings of cast iron, steel, non-ferrous materials, hand moulding, machine moulding and melting furnaces. Induction heating and gas fired furnaces

Lathe

1. Introduction to turning machine and allied services like cutting tool grinding, general shop layout including maintenance, oils, tools and gauge stores.
2. Different exercises in turning like plain turning, step-turning, facing, chamfering, knurling, parting off and thread cutting, use of compound slide and tailstock, tool grinding, selection of coolant and lubricants and speed and feeds. Use of safety goggles.

STUDY SCHEME		EVALUATION SCHEME							Total Marks
		Internal Assessment			External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	4	-	25	-	-	50	2	



Detailed Contents

Unit No. 1 Joints and Bearings

Topic No.1: Universal joint

TopicNo.2: Slip joint

Topic No.3: Bush bearing

TopicNo.4: Ball bearing

Topic No.5: Roller bearing

Unit No. 2 Engine Components

Topic No.6: Four Stroke Petrol Engine Piston

Topic No.7: Four Stroke Diesel Engine Piston

Topic No.8: Connecting rod

TopicNo.9: Crank shaft – 4 cylinder Engine

Topic No.10: Spark Plug

Unit No. 3 Gears

Topic No.11: Nomenclature of gears

Topic No.12: Profile of spur gear by 'Approximate method'

Topic No.13: Profile of spur gear by "Unwin's Method"

Unit No. 4 Cam Profile

Topic No.14: Different types of cams and followers

Topic No.15 Drawing of cam profile for following motion of follower

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	6	-	50	100	3	25	2	175

RECOMMENDED BOOKS

1. Auto Engineering Drawing by RB Gupta; Satya Parkashan, New Delhi
2. Automobile Engg. Drawing by Raj Kumar, North Publication, Jalandhar
3. Machine Drawing by PS Gill; BD Kataria and Sons, Ludhiana
4. Machine Drawing by Lakshminarayan; Jain Brothers, New Delhi
5. Automobile Engineerig- Vol. I and II by Dr. Kirpal Singh, Standard Pulisher