

**STATE BOARD OF TECHNICAL EDUCATION, BIHAR****Scheme of Teaching and Examinations for****III SEMESTER DIPLOMA IN AUTOMOBILE ENGINEERING / MECH. ENGG.(AUTO)****( Effective from Session 2016-17 Batch )****THEORY**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Applied Mathematics-II	1615301	04	03	10	20	70	100	28	40	03
2.	Mechanical Engineering Drawing	1625302	03	03	10	20	70	100	28	40	03
3.	Mechanics of Solids	1625303	02	03	10	20	70	100	28	40	02
4.	Mechanical Engineering Material	1625304	03	03	10	20	70	100	28	40	03
5.	Automobile Transmission Systems	1633305	02	03	10	20	70	100	28	40	02
<b>Total :-</b>			<b>14</b>				<b>350</b>	<b>500</b>			

**PRACTICAL**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Mechanics of Solids Lab.	1625306	02	03	15	35	50	20	01
7.	Automobile Transmission Systems Lab.	1633307	02	03	15	35	50	20	01
8.	Manufacturing Technology Lab.	1625308	04	03	15	35	50	20	03
<b>Total :-</b>							<b>150</b>		

**TERM WORK**

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Mechanical Engineering Drawing (TW)	1625309	04	15	35	50	20	02
10.	Development of Life Skills – II (TW)	1625310	03	07	18	25	10	02
11.	Professional Practices- III (TW)	1625311	04	07	18	25	10	02
<b>Total :-</b>						<b>100</b>		
<b>Total Periods per week Each of duration One Hour</b>					<b>33</b>		<b>Total Marks = 750</b>	<b>24</b>

**APPLIED MATHEMATICS -II**  
**(CIV/CIV(RURAL)/MECH./MECH.(AUTO)/AUTO. ENGG)**

<b>Subject Code 1615301</b>	<b>Theory</b>						<b>Credits  03</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>ESE</b>	<b>:</b>	<b>70</b>	
	<b>04</b>	<b>—</b>	<b>—</b>	<b>TA</b>	<b>:</b>	<b>10</b>	
	<b>—</b>	<b>—</b>	<b>—</b>	<b>CT</b>	<b>:</b>	<b>20</b>	

**CONTENTS :THEORY**

<b>Name of the Topic</b>		<b>Hrs/week</b>	<b>Marks</b>
<b>Unit -1</b>	<b>Integration:</b> 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by substitution 1.3.2 Integration of rational functions. 1.3.3 Integration by partial fractions. 1.3.4 Integration by trigonometric transformation. 1.3.5 Integration by parts. 1.4 Definite Integration. 1.4.1 Definition of definite integral. 1.4.2 Properties of definite integral with simple problems.	<b>10</b>	<b>18</b>
	1.5 <b>Applications of definite integrals.</b> 1.5.1 Area under the curve. Area bounded by two curves, 1.5.2 Volume of revolution. 1.5.3 Centre of gravity of a rod, plane lamina. 1.5.4 Moment of Inertia of uniform rod, rectangular lamina 1.5.5 Theorems of parallel and perpendicular axes.	<b>08</b>	<b>10</b>
<b>Unit -2</b>	<b>Differential Equation</b> 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant. 2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Nonhomogeneous, Exact, Linear and Bernoulli equations. 2.3 <b>Applications of Differential equations.</b> 2.3.1 Rectilinear motion (motion under constant and variable acceleration) 2.3.2 Simple Harmonic Motion.	<b>10</b>	<b>10</b>
<b>Unit - 3</b>	<b>Probability Distribution</b> 3.1 Binomial distribution. 3.2 Poisson's distribution. 3.3 Normal distribution 3.4 Simple examples corresponding to production process.	<b>08</b>	<b>12</b>
<b>Unit - 4</b>	<b>Numerical Methods</b> 4.1 <b>Solution of algebraic equations</b> Bisection method, Regulafalsi method and Newton – Raphson method. 4.2 <b>Solution of simultaneous equations containing 2 and 3 unknowns</b> Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's methods.	<b>06</b>	<b>06</b>
<b>Total</b>		<b>48</b>	<b>70</b>

<b>Text/Reference Books:</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
Calculus: single variable	Robert T. Smith	Tata McGraw Hill
Advanced	Murray R Spiegel	Schaum outline series
Mathematics for Engineers and Scientist		McGraw Hill
Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Dehli
Introductory Methods of Numerical analysis	S. S. Sastry	Prentice Hall Of India New Dehli
Numerical methods for Engg. 4 <sup>th</sup> ed.	Chapra	Tata McGraw Hill
Numerical methods for scientific & engineering computations	M. K. Jain & others	Wiley Eastern Publication.
Applied Mathematics	R. Jasse Phagan	
Introduction to foundations of applied mathematics.	Mark. H. Holmes	
Applied Mathematics	Rajendra Pal, S.N. Malik	Foundation Publishing

# **MECHANICAL ENGINEERING DRAWING**

## **(MECHANICAL ENGINEERING GROUP)**

Subject Code 1625302	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	03

### Contents: Theory

Name of the Topic		Hrs/week	Marks
<b>Unit -1</b>	<b>Auxiliary views:</b> - Study of auxiliary planes, Projection of objects on auxiliary planes. Completing the regular views with the help of given auxiliary views (Use first angle method of projection)	<b>08</b>	<b>12</b>
<b>Unit -2</b>	<b>Intersection of solids:-</b> Curves of intersection of the surfaces of the solids in the following cases (a) Prism with prism, Cylinder with cylinder, Prism with Cylinder When (i) the axes are at 90° and intersecting (ii) The axes are at 90° and Offset (b) Cylinder with Cone When axis of cylinder is parallel to both the reference planes and cone resting on base on HP and with axis intersecting and offset from axis of cylinder	<b>08</b>	<b>12</b>
<b>Unit - 3</b>	<b>Developments of Surfaces:-</b> Developments of Lateral surfaces of cube, prisms, cylinder, pyramids, cone and their applications such as tray, funnel, Chimney, pipe bends etc.	<b>08</b>	<b>10</b>
	<b>Conventional Representation:-</b> 1. Standard convention using SP – 46 (1988) (a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber (b) Long and short break in pipe, rod and shaft. (c) Ball and Roller bearing, pipe joints, cocks, valves, internal / external threads. (d) Various sections- Half, removed, revolved, offset, partial and aligned sections. (e) Knurling, serrated shafts, splined shafts, and chain wheels. (f) Springs with square and flat ends, Gears, sprocket wheel (g) Countersunk & counterbore. (h) Tapers	<b>04</b>	<b>08</b>
	<b>Limits, Fits and Tolerances:-</b> 1. Characteristics of surface roughness- Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods. 2. Introduction to ISO system of tolerancing, dimensional tolerances, elements of interchangeable system, hole & shaft based system, limits, fits & allowances. Selection of fit. 3. Geometrical tolerances, tolerances of form and position and its geometric representation. 4. General welding symbols, sectional representation and symbols used in Engineering practices	<b>04</b>	<b>06</b>

	<b>Details to Assembly:-</b> <ol style="list-style-type: none"> <li>1. Introduction-</li> <li>2. Couplings – Universal couplings &amp; Oldham’s Coupling</li> <li>3. Bearing – Foot Step Bearing &amp; Pedestal Bearing</li> <li>4. Lathe tool Post</li> <li>5. Machine vice &amp; Pipe Vice</li> <li>6. Screw Jack</li> <li>7. Steam Stop Valve</li> </ol>	<b>08</b>	<b>12</b>
	<b>Assembly to Details:-</b> <ol style="list-style-type: none"> <li>1. Introduction –</li> <li>2. Pedestal Bearing</li> <li>3. Lathe Tail Stock</li> <li>4. Drilling Jig</li> <li>5. Piston &amp; connecting rod</li> <li>6. Gland and Stuffing box Assembly</li> <li>7. Valve – Not more than eight parts</li> <li>8. Fast &amp; loose pulley</li> </ol>	<b>08</b>	<b>10</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text / Reference Books:</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Machine Drawing	N.D.Bhatt	Charotar Publication, Anand
Code of practice for general engineering drawing.	IS Code SP 46 (1988)	Engineering Drawing Practice for School and colleges
Production Drawing	L.K.Narayanan, P.Kannaich, K.VenkatReddy	New Age International Publication
Machine Drawing	P.S.Gill	S.K.Kataria and Sons
Engineering Graphics (For Topic on Auxiliary Views)	M.L.Dabhade	--
Machine Drawing	Sidheshwar	Tata McGraw Hill
The Mechanical Engineering Drawing	Paul Green	
Machine drawing	K.L Narayana	

**MECHANICS OF SOLIDS**  
**(MECHANICAL ENGINEERING GROUP)**

Subject Code 1625303	Theory			Credits		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	ESE	:	70
	02	—	—	TA	:	10
	—	—	—	CT	:	20

**CONTENTS: THEORY**

Name of the Topic		Hrs/week	Marks
<b>Unit -1</b>	<b>Mechanical Properties of Materials, Simple stresses &amp; Strains:-</b> 1.1 Types of loads, Simple stresses & strains viz. tensile, compressive, Shear, Crushing, Thermal stresses, Hoop stresses & corresponding strains, Volumetric Strain, Bulk modulus, Hook's law, Young's modulus, Modulus of Rigidity, stress-strain curves for ductile & brittle materials, Poisson's ratio. 1.2 Concept of stresses & strains in thin cylindrical & spherical shells subjected to internal pressure. 1.3 Concepts of Buckling – Rankine's & Euler's formulae for buckling load for columns / shafts under compression, concepts of equivalent length for various end conditions. 1.4 Concepts of Deflection & slope of beams – relation between bending moment & slope. Deflection of simply supported beams and cantilever beams subjected to point load. (No derivation) (Problems on compressive & tensile stresses, Thermal stresses, butt & lap riveted joints, simple cases of buckling).	<b>10</b>	<b>18</b>
<b>Unit -2</b>	<b>Strain Energy:-</b> 2.1 Concept, derivation & use of expression for deformation of axially loaded members under gradual, sudden & impact load. 2.2 Strain energy due to self-weight.	<b>03</b>	<b>04</b>
<b>Unit -3</b>	<b>Bending Moment &amp; Shear Force:-</b> 1.1 Shear force, bending moment & relation between them. 1.2 Shear force & bending moment diagrams for simply supported beam & cantilevers subjected to point loads & Uniformly distribution load, concept of Uniformly varying load & couples acting on beam. 1.3 Location of point of contraflexure. (Problems to be based on simply supported & cantilever beams with point load & UDL only)	<b>08</b>	<b>10</b>
<b>Unit -4</b>	<b>Moment of Inertia:-</b> 4.1 Definition of Moment of inertia, Moment of inertia of different laminae, radius of gyration. 4.2 Parallel & perpendicular axis theorem. 4.3 Moment of inertia of rectangular, circular, semicircular. Triangular, Hollow Rectangular, symmetrical I - Section, Channel section, Tee- section, angle section about centroidal axis. 4.4 Polar moment of inertia.	<b>03</b>	<b>08</b>
<b>Unit -5</b>	<b>Bending &amp; Shear stresses:-</b> 5.1 Theory of simple bending, equation of bending. 5.2 Assumptions in the theory of bending, moment of resistance, section modulus & neutral axis. 5.3 Shear stresses – concepts of direct & transverse shear stress.	<b>06</b>	<b>08</b>

<b>Unit -6</b>	<b>Combination of Bending &amp; Direct stresses</b> 6.1 Axial load, eccentric load, direct stresses, bending stresses maximum & minimum stresses. 6.2 Application of the above concepts for machine parts such as offset links, C-clamp, Bench vice, Drilling machine frame, stresses at base of a short column, condition for no tension at extreme fibres, total stress variation diagrams. (Simple problems on above applications).	<b>08</b>	<b>10</b>
<b>Unit -7</b>	<b>Principal Planes &amp; Principal Stresses:-</b> 7.1 Definition of principal plane & principal stresses. 7.2 Expression for normal and tangential stress, maximum shear stress. 7.3 Stresses on inclined planes. 7.4 Position of principal planes & planes of maximum shear. 7.5 Graphical solution using Mohr's circle of Stresses.	<b>06</b>	<b>06</b>
<b>Unit -8</b>	<b>Torsion:-</b> 8.1 Concept of Pure Torsion, Torsion equation for solid and hollow circular shafts. Assumptions in theory of pure Torsion. 8.2 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft)	<b>04</b>	<b>06</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text / Reference Books:</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Strength of Material	Andrew Pytel Fedrinand L. Singer	Addison-Wesley An imprint of Addison Wesley Longman, Inc. Forth edition
Strength of Material	G.H.Ruder	ELBS with Macmillan third edition
Strength of Material	B.K.Sarkar	Tata McGraw hill New Delhi
A Text Book strength of Material	Dr. R. K.Bansal	Laxmi Publication New Delhi
Strength of Material	S Ramamrutham	Dhanpat Rai & Publication New Delhi
Strength of Material	R.S.Khurmi	S.Chand Company Ltd. Delhi
Materials Science	G.K.Narula K.S.Narula	Tata McGraw hill New Delhi
Mechanics and strength of materials	Vitor Dias Da Silva	
Mechanics of materials	Beer, Johnston & dewolf	

# **MECHANICAL ENGINEERING MATERIALS**

## **(MECHANICAL ENGINEERING GROUP)**

Subject Code 1625304	Theory			Credits		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	ESE	:	70
	03	—	—	TA	:	10
	—	—	—	CT	:	20

03

### **CONTENTS : THEORY**

	Name of the Topic	Hours	Marks
<b>UNIT-1.</b>	<b>Engineering Materials and their Properties</b> 1.1 Introduction, Classification and Application of Engineering materials, I.S specification of materials like plain carbon steel, Grey Cast iron, low alloy steels & bearing Materials. <ul style="list-style-type: none"> <li>Properties of metals               <ul style="list-style-type: none"> <li>Physical Properties – Structure, Density, Melting point.</li> <li>Mechanical Properties – Strength, elasticity, ductility, malleability, plasticity, toughness, hardness, hardenability, brittleness, fatigue, thermal conductivity, electrical conductivity, thermal coefficient of linear expansion</li> </ul> </li> <li>Introduction to Corrosion, types of Corrosion, Corrosion resisting materials.</li> </ul>	<b>06</b>	<b>08</b>
<b>UNIT-2.</b>	<b>Ferrous Metals and Alloys</b> <ul style="list-style-type: none"> <li>Characteristics and application of ferrous metals</li> <li>Phase equilibrium diagram for Iron and Iron Carbide.</li> <li>Flow diagram for production of Iron and Steel, Classification, composition and uses of cast iron, effect of sulphur, silicon and phosphorous.</li> <li>Classification, composition and application of low carbon steel, medium carbon steel and high carbon steel with their chemical composition.</li> <li>Alloy Steels: - Low alloy steel, high alloy steel, tools steel &amp; stainless steel. Effect of various alloying elements such as – Chromium, nickel, manganese, molybdenum, tungsten, vanadium.</li> <li>Tool Steels: - High speed Steels (HSS), Hot &amp; cold Working dies, shear, punches etc., properties &amp; applications.</li> <li>Magnetic materials: - Properties &amp; Applications of commonly used magnetic materials (Permanent magnets and temporary magnets).</li> <li>Special Cutting Tool Materials – Diamond, Stellites &amp; Tungsten Carbide</li> </ul>	<b>12</b>	<b>18</b>
<b>UNIT-3.</b>	<b>Non Ferrous Metals and Alloys</b> <ul style="list-style-type: none"> <li>Properties, applications &amp; chemical compositions of Copper alloys (naval brass, muntz metal, Gun metal &amp; bronzes), Aluminium alloys (Y-alloy &amp; duralumin) &amp; bearing materials like white metals, leaded bronzes &amp; copper lead alloys.</li> <li>Desired properties of bearing materials.</li> </ul>	<b>06</b>	<b>10</b>
<b>UNIT-4.</b>	<b>Heat Treatment of Steels</b> 4.1 Introduction to Heat treatment processes such as Annealing, subcritical annealing, Normalizing, Hardening, Tempering (Austempering & Martempering) - Principle, Advantages, limitations and applications. 4.2 Surface Hardening - Methods of surface hardening, i) case hardening ii) Flame Hardening, iii) Induction Hardening, iv) Nitriding, v) Carburizing - Principle, advantages, limitations and applications	<b>08</b>	<b>14</b>



<b>UNIT-5.</b>	<b>Non Metallic Materials</b> 5.1 Polymeric Materials – Introduction to Polymers- types, characteristics, properties and uses of Thermoplastics, Thermosetting Plastics & Rubbers. 5.2 Thermoplastic Plastics - characteristics and uses of ABS, Acrylics, Nylons and Vinyls 5.3 Thermosetting Plastics - Characteristics and uses of polyesters, Epoxies, Melamines & Bakelites. 5.4 Rubbers – Neoprene, Butadiene, Buna & Silicons – Properties & applications. 5.5 Properties and applications of following Engineering Materials – Ceramics, Abrasive, Adhesive and Insulating materials such as Cork, Asbestos, Thermocole and Glass Wool 5.6 Introduction to Composite Materials – Laminated & Fibre reinforced materials - Structure, Properties & Applications.	<b>08</b>	<b>10</b>
<b>UNIT-6.</b>	<b>Powder Metallurgy &amp; Nondestructive Testing</b> 6.1 Advantages, limitations and applications of Powder Metallurgy for engineering products. Brief Description of Process of Powder Metallurgy – Powder making, blending, compacting, sintering, infiltration & impregnation. 6.3 Applications of Powder metallurgy for tungsten carbide tip tools & porous bearing. 6.4 Importance of Non-destructive testing, Difference between Destructive and Nondestructive testing. 6.5 Nondestructive testing methods - Radiography (X-Ray & Gamma Ray), Ultrasonic crack detection, Dye penetrant test, Magnaflux test – Comparison & applications.	<b>08</b>	<b>10</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text/Reference Books:</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
A Text Book of Material Science and Metallurgy	O.P.Khanna	Dhanpat Rai and Sons [1999]
Material Science And Metallurgy	Dr.V.D. Kodgire	Everest Publishing House [1990]
Material Science and Engineering	R.K.Rajput	S.K.Katari and Sons [2002 reprint 2003]
Material Science and Processes	S.K.Hazra and Choudhari	Indian Book Distribution Co. [1982]
Engineering Materials Properties and Selection	Kenneth G. Budinski and Micheal K. Budinski	Pearson Education, New Delhi
ASME Material Manuals	ASME	
Introduction to Physical metallurgy	Sidney H. Avner	Tata Mc Graw Hill edition (2 <sup>nd</sup> )
Mechanical Engineering Materials	R.M. Pandey, Umesh Kumar	Foundation Publishing

# **AUTOMOBILE TRANSMISSION SYSTEMS**

## **(AUTOMOBILE ENGINEERING GROUP)**

Subject Code 1633305	Theory			Credits		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	ESE	:	70
	02	—	—	TA	:	10
				CT	:	20

### **CONTENTS: THEORY**

Name of the Topic		Hrs/week	Marks
<b>Unit -1</b>	<b>Vehicle layout and Chassis frame:-</b> 1.1 Classification and specifications of Chassis- 2-Wheeler, Passenger car, Commercial Vehicle. 1.2 Vehicle layout & its types—2 Wheel Drive- Front Engine Front Wheel Drive, Rear Engine Rear Wheel Drive, Front Engine Rear Wheel Drive & 4 Wheel Drive. 1.3 Major assemblies – their locations and functions. 1.4 Various loads acting on chassis frame. 1.5 Type of frames, frames construction, and material- 2 wheeler and 4 - wheeler.	<b>08</b>	<b>12</b>
<b>Unit -2</b>	<b>Clutches:-</b> 2.1 Principle and necessity of Clutch. 2.2 Various types of clutches used in Automobiles – single plate, multiplate clutches - dry & wet clutches, centrifugal clutch, Semi-centrifugal clutch, diaphragm clutch. 2.3 Materials used for clutch lining. 2.4 Hydraulic & mechanical clutch linkage, Cable operated clutch linkage. 2.5 Fluid coupling- principle, construction and working.	<b>10</b>	<b>14</b>
<b>Unit - 3</b>	<b>Gear Boxes:-</b> 3.1 Principle and necessity of Gear Box. 3.2 Types, construction and working of gear boxes & their layouts such as sliding mesh, constant mesh, synchromesh type, vario - drive, transfer case. 3.3 Gear ratios with the help of power flow diagrams. 3.4 Gear shift mechanism. 3.5 Overdrive 3.6 Concepts of automatic gear box. 3.7 Torque Converter- principle, construction and working	<b>10</b>	<b>14</b>
<b>Unit – 4</b>	<b>Propeller shafts, universal joints &amp; slip joints:-</b> 4.1 Necessity and function of Propeller Shaft. 4.2 Constant velocity Joints- Inboard & outboard Joints- Rzeppa Joint, Tripod Joint. 4.3 Universal joint and slip joint. 4.4 Hotchkiss drive and torque tube drive.	<b>06</b>	<b>08</b>
<b>Unit – 5</b>	<b>Final drive:-</b> 5.1 Principle, Necessity and function of final drive and differential. 5.2 Working of differential and differential lock. Backlash in differential. 5.3 Types of rear axles such as semi - floating, three quarter floating and full floating type. 5.4 Transmission in two wheeler- chain drive and belt drive. 5.5 Spur differential construction.	<b>08</b>	<b>14</b>

<b>Unit – 6</b>	<b>Wheels and Tyres</b> 6.1 Types of wheels, rims and tyres. 6.2 Tyre materials, construction. 6.3 Necessity and types of treads. 6.4 Tyre inflation and its effect. Tyre rotation and nomenclature	<b>06</b>	<b>08</b>
	<b>Total</b>	<b>48</b>	<b>70</b>

<b>Text / Reference Books:-</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Motor automotive technology	Anthony Schwaller	Delmar Publisher Inc.
Automotive service	Tim Gills	Delmar Publisher Inc.
Automobile Engineering Vol. II	Anil Chikkara	Satya Prakashan New Delhi
Automobile Mechanics	Crouse / Anglin.	TATA McGraw – HILL
Automobile Engineering Vol.-I	Kirpal Singh	Standard Publication
The Automobile	Harbans Singth Royat	S. Chand Publication
Automobile Engineering	R.B. Gupta	Satya Prakashan New Delhi
Automotive Mechanics	S. Srinivisan	TATA McGraw – HILL
Automotive Technology	H M SETHI	TATA McGraw– HILL
A text book of Automobile Engineering	R.K Rajput	
Transmission Chassis & releted systems	John Whipp	

**MECHANICS OF SOLIDS LAB**  
**(MECHANICAL ENGINEERING GROUP)**

<b>Subject Code 1625306</b>	<b>Practical</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>	<b>Credits  01</b>
	<b>No. of Periods Per Week</b>			<b>ESE</b>	<b>:</b>	<b>50</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>15</b>	
	<b>-</b>	<b>—</b>	<b>02</b>	<b>External</b>	<b>:</b>	<b>35</b>	

**Contents: *Practical***

Skills to be developed:

**Intellectual Skill:**

- 1 Identification of different parts of machine and their function.
- 2 Interpretation failure patterns of different metal under different action.
- 3 Extrapolating test result or observation during test.
- 4 Testing different metals and comparison of experimental result.

**Motor Skill:**

- 1 Sketch of standard specimen, arrangement for test on respective machines.
- 2 Measurement of different parameters.
- 3 Handling Instrument.
- 4 Observing behavior of different metal during test.

**List of Laboratory Experiments :-**

<b>S.No</b>	
1	<ul style="list-style-type: none"> <li>• Study and demonstration of Universal Testing Machine &amp; its attachments.</li> </ul>
2	<ul style="list-style-type: none"> <li>• Study &amp; demonstration of Extensometer.</li> </ul>
3	<ul style="list-style-type: none"> <li>• Tension Test on mild steel, Aluminium &amp; compression test on cast iron on Universal Testing Machine.</li> </ul>
4	<ul style="list-style-type: none"> <li>• Direct Shear Test of mild steel on Universal Testing Machine.</li> </ul>
5	<ul style="list-style-type: none"> <li>• Brinell Hardness Test on Mild Steel.</li> </ul>
6	<ul style="list-style-type: none"> <li>• Rockwell hardness Test on Hardened Steel.</li> </ul>
7	<ul style="list-style-type: none"> <li>• Izod &amp; Charpy - Impact tests of a standard specimen.</li> </ul>
8	<ul style="list-style-type: none"> <li>• Torsion Test on Mild steel bar.</li> </ul>
9	<ul style="list-style-type: none"> <li>• Assignments: Drawing sheet on shear force &amp; bending Moment diagrams for a given loading (At least four problems.).</li> <li>a) Estimation of principal stresses and maximum shear strain for a given combined loading by analytical &amp; Mohr's circle method. (At least two problems.).</li> </ul>

# **AUTOMOBILE TRANSMISSION SYSTEMS LAB**

## **(AUTOMOBILE ENGINEERING GROUP)**

<b>Subject Code 1633307</b>	<b>Practical</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>	<b>Credits  01</b>
	<b>No. of Periods Per Week</b>			<b>ESE</b>	<b>:</b>	<b>50</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>15</b>	
	<b>-</b>	<b>—</b>	<b>02</b>	<b>External</b>	<b>:</b>	<b>35</b>	

### **Contents: Practical**

#### **Intellectual skill:**

1. Identify concepts applied.
2. Identify parts like clutch, gear box, universal joints, propeller shaft, final drive, wheels & tyres.
3. Classify the system according to their application.
4. Detect fault by observation & trial.
5. Take reading from various instruments like chassis dynamometer.

#### **Motor skill:**

1. Sketch the different devices.
2. Handle tools, equipment, and instrument.
3. Observe the behaviors of various system under various parameters.

#### **List of Practical/ Assignments:**

1. Draw various vehicle layouts for- two wheelers, three wheeler and four wheelers and compare them.
2. Open a single plate dry clutch assembly and sketch exploded view.
3. Open a multi-plate clutch used in two wheelers, observe the operating linkages and sketch the system.
4. Open any two types of gear boxes observe gear shifting, gear ratio and sketch the system & compare them.
5. Open & observe automatic transmission devices such as torque converter, various drive.
6. Open & observe universal joints such as Hooks universal joint.
7. Open the differential, sketch the unit with bearing locations.
8. Assembly & disassembly of any one type of rear axle.
9. Open any two types of tyres, wheels and rims, observe and sketch.

# **MANUFACTURING TECHNOLOGY LAB**

## **(MECHANICAL ENGINEERING GROUP)**

<b>Subject Code 1625308</b>	<b>Practical</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>	<b>Credits  03</b>
	<b>No. of Periods Per Week</b>			<b>ESE</b>	<b>:</b>	<b>50</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>15</b>	
	<b>-</b>	<b>—</b>	<b>04</b>	<b>External</b>	<b>:</b>	<b>35</b>	

### **Contents: Practical**

Skills to be developed:

#### **Intellectual skills:**

- 1) To develop concept of pattern making.
- 2) To understand the safety aspects to be followed on the shop floor.
- 3) To understand the different types of patterns & to compare them.
- 4) To know the different types of sands used in sand moulding.

#### **Motor Skills:**

- 1) To prepare solid pattern.
- 2) To use pattern for preparing moulds.
- 3) To operate & control lathe machine.
- 4) To operate & control drilling machine.
- 5) To follow the safety precautions on the shop floor.

#### **List of Practical:-**

1. Preparing one wooden pattern per student as per given drawing.
2. Develop one pattern for a given job considering all aspects of pattern making for group of 4 to 6 student. Job shall involve spit pattern with core, core print.
3. Preparation of a sand mould for any one of the above patterns.
4. Estimation of cost for the casting using the above pattern and mould.
5. One job for each student involving different lathe and drilling machine operations.
6. Assignment on selection of materials and required properties for automobile

# **MECHANICAL ENGG. DRAWING- TW**

## **(MECHANICAL ENGG. GROUP)**

Subject Code <b>1625309</b>	Term Work						Credits <b>02</b>
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	
	-	—	04	External	:	35	

### **CONTENTS: TERM WORK**

Skills to be developed:

#### **Intellectual Skills:**

1. Understand interpenetration of solid.
2. Interpret limits, fits and tolerances on a given drawing.
3. Visualize assembly of components from given details.
4. Interpret Conventional symbols as per IS code SP46.
5. Identify different materials and their properties.

#### **Motor Skills:**

1. Draw front view and top view of solids Penetrating one with other.
2. Conventionally represent limit, fits and tolerances on a given drawing as per the manufacturing processes.
3. Give surface roughness values and symbols on a part drawing..
4. Setting and use of different drawing equipments.
5. Record bill of materials in assembly drawing.
6. Use computer aided drafting package.

#### **List of Term Work:**

(Use first angle method of projection)

##### **1. Intersection of Solids**

- (i) One Sheet containing atleast two problems.
- (ii) Atleast four problems for home assignment in sketch book.

##### **2. Development of surfaces**

Any two problems on development of surfaces of different objects. (one Sheet)

##### **3. Auxiliary views**

One sheet containing two problems

At least two problems as home assignment in sketch book

##### **4. Conventional Representation as per SP – 46 (1988) - one sheet**

##### **5. Limit, Fit, Tolerances and Machining Symbols – one sheet**

##### **6. Assembly to detailed drawings of components including conventional representation of tolerances and surface finish symbols:**

One sheet covering any one assembly and its details

At least two problems as home assignment in sketch book

##### **7. Details to Assembly Draw One sheet covering any one assembly and its details.**

Solve at least two problems as home assignment in sketchbook.

##### **8. Two problems on assembly drawings using any CAD Package (Assembly containing maximum 6 to 7 components- minimum 12 hours)**

# DEVELOPMENT OF LIFE SKILLS-II -TW

## (MECHANICAL ENGG. GROUP)

<b>Subject Code 1625310</b>	<b>Term Work</b>						<b>Credits  02</b>
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>25</b>	
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>07</b>	
	<b>—</b>	<b>—</b>	<b>03</b>	<b>External</b>	<b>:</b>	<b>18</b>	

<b>Contents : Term Work</b>		<b>Hrs/week</b>
	<b>Name of Topics</b>	<b>HOURS</b>
<b>Unit-1</b>	<b>SOCIAL SKILLS</b> SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY.	<b>01</b>
<b>Unit-2</b>	Swot Analysis – Concept , How to make use of SWOT.	<b>01</b>
<b>Unit-3</b>	<b>Inter personal Relation</b> Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	<b>02</b>
<b>Unit-4</b>	<b>Problem Solving</b> 4 <b>STEPS IN PROBLEM SOLVING</b> , 4.1 IDENTIFY AND CLARIFY THE PROBLEM, 4.2 INFORMATION GATHERING RELATED TO PROBLEM, 4.3 EVALUATE THE EVIDENCE, 4.4 CONSIDER ALTERNATIVE SOLUTIONS AND THEIR IMPLICATIONS, 4.5 CHOOSE AND IMPLEMENT THE BEST ALTERNATIVE, 6)REVIEW 5 <b>Problem solving technique</b> .(any one technique may be considered) 5.1 Trial and error, 2) Brain storming, 3) Lateral thinking	<b>02</b>
<b>Unit-5</b>	<b>Presentation Skills</b> Body language -- Dress like the audience Posture, Gestures, Eye contact and facial expression. PRESENTATION SKILL – STAGE FRIGHT, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board	<b>03</b>
<b>Unit-6</b>	<b>Group discussion and Interview technique –</b> Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making <b>INTERVIEW TECHNIQUE</b> NECESSITY, TIPS FOR HANDLING COMMON QUESTIONS.	<b>03</b>
<b>Unit-7</b>	<b>Working in Teams</b> UNDERSTAND AND WORK WITHIN THE DYNAMICS OF A GROUPS. TIPS TO WORK EFFECTIVELY IN TEAMS, ESTABLISH GOOD RAPPORT, INTEREST WITH OTHERS AND WORK EFFECTIVELY WITH THEM TO MEET COMMON OBJECTIVES, TIPS TO PROVIDE AND ACCEPT FEEDBACK IN A CONSTRUCTIVE AND CONSIDERATE WAY , LEADERSHIP IN TEAMS, HANDLING FRUSTRATIONS IN GROUP.	<b>02</b>



<b>Unit-8</b>	<b>Task Management</b> INTRODUCTION, TASK IDENTIFICATION, TASK PLANNING ,ORGANIZING AND EXECUTION, CLOSING THE TASK	<b>02</b>
	<b>Total</b>	<b>16</b>

**List of Assignment: (Any Eight) :-**

1) SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.

- a) Your past experiences,
- b) Achievements,
- c) Failures,
- d) Feedback from others etc.

2) Undergo a test on reading skill/memory skill administered by your teacher.

3) Solve the puzzles.

4) Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc.( One activity per group)

5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.

6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme.####

7) Conduct an interview of a personality and write a report on it.

8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed

9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

**Note:** - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

**Mini Project** on Task Management. Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

<b>Text /Reference Books :</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Adams Time management	Marshall Cooks	Viva Books
Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India, Pvt Ltd
Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
Decision making & Problem Solving	by Adair, J	Orient Longman
Develop Your Assertiveness	Bishop , Sue	Kogan Page India
Make Every Minute Count	Marion E Haynes	Kogan page India
Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
Presentation Skills	Michael Hatton ( Canada – India Project)	ISTE New Delhi
Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
Target setting and Goal	Richard Hale ,Peter Whilom	Kogan page India
Time management	Chakravarty, Ajanta	Rupa and Company
Working in Teams	Harding ham .A	Orient Longman
Development of Life Skill-II	Sudha Ranjan	Foundation Publishing
<b>INTERNET ASSISTANCE</b> <ol style="list-style-type: none"> <li>1. <a href="http://www.mindtools.com">http://www.mindtools.com</a></li> <li>2. <a href="http://www.stress.org">http://www.stress.org</a></li> <li>3. <a href="http://www.ethics.com">http://www.ethics.com</a></li> <li>4. <a href="http://www.coopcomm.org/workbook.htm">http://www.coopcomm.org/workbook.htm</a></li> <li>5. <a href="http://www.mapforprofits.org/">http://www.mapforprofits.org/</a></li> <li>6. <a href="http://www.learningmeditation.com">http://www.learningmeditation.com</a> <a href="http://bbc.co.uk/learning/courses/">http://bbc.co.uk/learning/courses/</a></li> <li>7. <a href="http://eqi.org/">http://eqi.org/</a></li> <li>8. <a href="http://www.abacon.com/commstudies/interpersonal/indisclosure.html">http://www.abacon.com/commstudies/interpersonal/indisclosure.html</a></li> <li>9. <a href="http://www.mapnp.org/library/ethics/ethxgde.htm">http://www.mapnp.org/library/ethics/ethxgde.htm</a></li> <li>10. <a href="http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm">http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm</a></li> <li>11. <a href="http://members.aol.com/nonverbal2/diction1.htm">http://members.aol.com/nonverbal2/diction1.htm</a></li> <li>12. <a href="http://www.thomasarmstrong.com/multiple_intelligences.htm">http://www.thomasarmstrong.com/multiple_intelligences.htm</a></li> <li>13. <a href="http://snow.utoronto.ca/Learn2/modules.html">http://snow.utoronto.ca/Learn2/modules.html</a></li> <li>14. <a href="http://www.quickmba.com/strategy/swot/">http://www.quickmba.com/strategy/swot/</a></li> </ol>		

# **PROFESSIONAL PRACTICES-III- TW**

## **(MECHANICAL ENGG. GROUP)**

<b>Subject Code</b> <b>1625311</b>	<b>Term Work</b>			<b>Credits</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>25</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Internal</b>	<b>:</b>	<b>07</b>
	—	—	<b>04</b>	<b>External</b>	<b>:</b>	<b>18</b>

Contents :Term Work			Hrs/week	
Chapter	Activities		Hours	
Unit-1	<b>Industrial Visits</b>  Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work.  <b>TWO</b> industrial visits may be arranged in the following areas / industries : <div><div>2</div><div>Manufacturing organizations for observing various manufacturing processes including heat treatment</div></div> <div><div>3</div><div>Material testing laboratories in industries or reputed organizations</div></div> <div><div>4</div><div>Auto workshop / Garage</div></div> <div><div>5</div><div>Plastic material processing unit</div></div> <div><div>6</div><div>ST workshop / City transport workshop</div></div>		08	
	Lectures by Professional / Industrial Expert be organized from <b>ANY THREE</b> of the following areas : <div><div>3</div><div>Use of a plastics in automobiles.</div></div> <div><div>4</div><div>Nonferrous Metals and alloys for engineering applications</div></div> <div><div>5</div><div>Surface Treatment Processes like electroplating, powder coating etc.</div></div> <div><div>6</div><div>Selection of electric motors.</div></div> <div><div>7</div><div>Computer aided drafting.</div></div> <div><div>8</div><div>Industrial hygiene.</div></div> <div><div>9</div><div>Composite Materials.</div></div> <div><div>10</div><div>Heat treatment processes.</div></div> <div><div>11</div><div>Ceramics</div></div> <div><div>12</div><div>Safety Engineering and Waste elimination</div></div>			08

Unit-3	<p><b>Individual Assignments :</b></p> <p><b>Any two</b> from the list suggested</p> <ol style="list-style-type: none"> <li>4 Process sequence of any two machine components.</li> <li>5 Write material specifications for any two composite jobs.</li> <li>6 Collection of samples of different plastic material or cutting tools with properties , specifications and applications.</li> <li>7 Preparing models using development of surfaces.</li> <li>8 Assignments on bending moment , sheer forces , deflection of beams and torsion chapters of strength of material.</li> <li>9 Select different materials with specifications for at least 10 different machine components and list the important material properties desirable.</li> <li>10 Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes.</li> <li>11 List the various properties and applications of following materials – a. Ceramics b. fiber reinforcement plastics c. thermo plastic plastics d. thermo setting plastics e. rubbers.</li> </ol> <p style="text-align: center;">OR</p> <p>Conduct <b>ANY ONE</b> of the following activities through active participation of students and write report</p> <ol style="list-style-type: none"> <li>12 Rally for energy conservation / tree plantation.</li> <li>5 Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc.</li> <li>6 Conduct aptitude , general knowledge test , IQ test</li> <li>6 Arrange <b>any one</b> training in the following areas :</li> <li>6.1 Yoga. B) Use of fire fighting equipment and First aid Maintenance of Domestic appliances</li> </ol>	08
Unit-4	<p><b>Modular courses ( Optional ) :</b></p> <p>A course module should be designed in the following areas for max. 12 hrs. Batch size – min. 15 students.</p> <p>Course may be organized internally or with the help of external organizations.</p> <ol style="list-style-type: none"> <li>7 Forging Technology.</li> <li>8 CAD-CAM related software.</li> <li>9 Welding techniques.</li> <li>10 Personality development.</li> <li>11 Entrepreneurship development.</li> </ol>	08

<b>Unit-5</b>	<b>3-D Design using software</b>  Computer screen, coordinate system and planes, definition of HP,VP, reference planes How to create them in 2 <sup>nd</sup> /3 <sup>rd</sup> environment. Selection of drawing site & scale. Commands of creation of Line, coordinate points, Axis, Poly lines, square, rectangle, polygon, sp line, circles, ellipse, text, move, copy, offset, Mirror, Rotate, Trison, Extend, Break, Chamfer, Fillet, Curves, Constraints fit tangency, perpendicularity, dimensioning Line convention, material conventions and lettering.  The Student should draw – different orthographic Views (including sections), Auxiliary views according to first/ Third angle method of projection. (Minimum two sheets, each containing two problems) after learning the contents as above.	<b>16</b>
	<b>Total</b>	<b>48</b>

<b>Text /Reference Books :</b>		
<b>Titles of the Book</b>	<b>Name of Authors</b>	<b>Name of the Publisher</b>
Professional Practices-III	Sudha Ranjan	Foundation Publishing

**List of Term Work: (Any Eight)**

- 1) SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.
  - a) Your past experiences,
  - b) Achievements,
  - c) Failures,
  - d) Feedback from others etc.
- 2) Undergo a test on reading skill/memory skill administered by your teacher.
- 3) Solve the puzzles.
- 4) Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.( One activity per group)
- 5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
- 6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme. #####
- 7) Conduct an interview of a personality and write a report on it.
- 8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed
- 9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

**Note:** - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The term work will consist of any eight assignments. Mini Project on Task Management. Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

**STATE BOARD OF TECHNICAL EDUCATION, BIHAR****Scheme of Teaching and Examinations for  
III SEMESTER DIPLOMA IN AGRICULTURAL ENGINEERING****(Effective from Session 2016-17 Batch)****THEORY**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Applied Mathematics-I	1600301	04	3	10	20	70	100	28	40	03
2.	Computer Programming Through 'C'	1600302	03	3	10	20	70	100	28	40	03
3.	Surveying and Levelling	1611303	03	3	10	20	70	100	28	40	03
4.	Refrigeration & Air-Conditioning	1611304	03	3	10	20	70	100	28	40	03
5.	Principles of Agricultural Production	1611305	03	3	10	20	70	100	28	40	03
<b>Total:-</b>			<b>16</b>				<b>350</b>	<b>500</b>			

**PRACTICAL**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Computer Programming Through 'C' Lab.	1600306	6	3	15	35	50	20	03
7.	Surveying & Levelling Lab.	1611307	4	3	15	35	50	20	02
Total:-			10	100					

**TERM WORK**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Refrigeration & Air-Conditioning (TW)	1611308	3	15	35	50	20	02
9.	Principles of Agricultural Production (TW)	1611309	4	30	70	100	40	02
<b>Total:-</b>			<b>07</b>			<b>150</b>		
Total Periods per week Each of duration One Hours = 33						<b>Total Marks = 750</b>	<b>24</b>	