REVISED CURRICULUM

OF

DIPLOMA OF ASSOCIATE ENGINEER

IN

MECHANICAL TECHNOLOGY

(FIRST YEAR)

Revised Scheme of Studies D.A.E. 1st Year Mechanical

Code		Subject	T	P	C
Gen	111	Islamiat and Pak Studies	1	0	1
ENG	112	Functional English	2	0	2
Math	113	Applied Mathematics	3	0	3
Phy	122	Applied Physics	1	3	2
Ch	112	Applied Chemistry	1	3	2
REVISED SUBJECTS					
MT	117	Workshop Practice – I (A) Metal Work 0 3 (B) Wood Work 0 3 (C) Welding and Forging 0 3 (D) Foundry 0 3 (E) Basic Machine Shop-I 0 3 Theory 2 0	2	15	7
Comp	142	Computer Application	1	3	2
MT	141	**Health Safety and Environment**	1	0	1
MT	163	Basic Engineering Drawing and CAD-I	1	6	3
TOTAL			**13**	**30**	**23**

Gen-111

ISLAMIAT AND PAKSTUDY

اسلامیات/مطالعہ پاکستان

			ٹی	پی	سی
حصہ اول	اسلامیات	Gen III	1	0	1
حصہ دوم	مطالعہ پاکستان				

موضوعات حصہ اول اسلامیات

1- تعارف قرآن مجید 2- نزول قرآن 3- مکی ومدنی سورتوں کی خصوصیات 4- وحی کی اقسام 3

5- پندرہ منتخب آیات معہ ترجمہ

1- لن تنالوا البر حتی تنفقوا مما تحبون

2- واعتصموا بحبل الله جمیعا ولا تفرقوا

3- ولا یجرمنکم شنان قوم علی ان لا تعدلوا

4- ان الله یامرکم ان تودوا الامانات الی اهلها

5- ان الله یامر بالعدل والاحسان

6- ان الصلوة تنهی عن الفحشاء والمنکر

7- لقد کان لکم فی رسول الله اسوة حسنة

8- ان اکرمکم عند الله اتقاکم

9- ومآ اتاکم الرسول فخذوه ومانهاکم عنه فانتهو

10- واوفوبالعهد

11- وعاشرو هن بالمعروف

12- یمحق الله الربوٰ ویربی الصدقات

13- واصبر علی ما اصابک

14- وقولوا قولا سدیدا

15- ان الدین عند الله الاسلام

(ب) **سنت**

1- **سنت کی اہمیت**

1- انما الاعمال بالنیات

2- [illegible]

6- خیر کم خیر کم لا هله

7- سباب المسلم فسوق وقتاله کفر

8- المومن اخوالمومن

9- کل المسلم علی المسلم حرام دمه وماله وعرضه

10- آیة المنافق ثلاثة اذا حدث کذب واذا اوتمن خان واذا وعد اخلف

2- **دین اسلام** (5)

2.1 اسلام کے بنیادی عقائد کی وضاحت اور انسان کی انفرادی واجتماعی زندگی پران کے اثرات

1- توحید

2- رسالت

3- آخرت

4- ملائکہ

5- آسمانی کتب

2.2 **عبادات** (5)

1- نماز 2- روزہ 3- حج 4- زکوٰۃ

مندرجہ بالا عبادات کی اہمیت وفضیلت، حکمتیں اور انسان کی انفرادی ومعاشرتی زندگی پر اس کے اثرات

عمومی مقصد۔ طالب علم یہ سمجھنے کے قابل ہو جائے گا کہ:

خصوصی مقاصد۔ طالب علم اس قابل ہو جائے گا کہ:

1- قرآن مجید کی تعریف کر سکے گا۔
2- قرآن مجید کے نزول کی صورت بیان کر سکے
3- قرآن مجید کی مکی و مدنی سورتوں کی پہچان کر سکے
4- منتخب آیات کا ترجمہ و تشریح کر سکے

عمومی مقصد۔ یہ سمجھنے کے قابل ہو جائے گا کہ منتخب قرآنی آیات کے ذریعے اسلامی تعلیمات کا مفہوم کیا ہے۔

خصوصی مقصد۔ طالب علم اس قابل ہو جائے کہ:

1- قرآنی آیات کا ترجمہ و تشریح کر سکے
2- قرآنی تعلیمات کی روشنی میں اپنی اور معاشرتی اصلاح کر سکے

2- سنت

عمومی مقصد۔ طالب علم حدیث نبوی کی اہمیت اور ضرورت کو اچھی طرح سمجھنے کے قابل ہو جائے گا۔

خصوصی مقاصد

☆ سنت کی تعریف بیان کر سکے
☆ سنت کی اہمیت و ضرورت کی وضاحت کر سکے
☆ سنت کی روشنی میں اسوۂ حسنہ پر عمل کر سکے

3- منتخب احادیث نبویہ

عمومی مقصد۔ احادیث کی روشنی میں اخلاقی اقدار سے آگاہی حاصل کر سکے

خصوصی مقاصد۔ احادیث کا ترجمہ و تشریح کر سکے

محمد رسول اللہ صلی اللہ علیہ وسلم کے اسوۂ حسنہ کی پیروی کا جذبہ پیدا ہو سکے۔

حصہ اول اخلاقیات Gen III

ٹی	پی	سی
1	0	1

کل وقت: 20 گھنٹے

حصہ دوم مطالعہ پاکستان

موضوعات

اخلاقیات کی تعریف اور اہمیت
اخلاقیات کا معیار (قانون۔عقل۔الہامی کتب)
مندرجہ ذیل اخلاق کی وضاحت

- دیانت داری
- وفاداری
- نظم وضبط
- راست گوئی
- صبر واستقلال
- حوصلہ مندی
- وقت کی پابندی
- صفائی
- اعتماد
- باہمی احترام
- مصلحت

نصاب اخلاقیات سال اول

تدریسی مقاصد

عمومی مقصد۔ اعلیٰ اخلاق کی وجہ سے ملکی ترقی میں قابل قدر اضافہ کر سکے۔

خصوصی مقاصد۔ طالب علم اس قابل ہوگا کہ:

- موضوعات کا مطلب بیان کر سکے۔
- عملی زندگی سے مثالوں کی نشاندہی کر سکے۔
- اپنی شخصیت اور معاشرے پر موضوعات کے مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے
- دیانت داری کی اہمیت بیان کر سکے۔
- وفاداری کی اہمیت بیان کر سکے۔
- نظم وضبط کی افادیت بیان کر سکے۔
- صدق بیان کی ضرورت بیان کر سکے۔
- حوصلہ مندی کے فوائد بیان کر سکے
- وقت کی پابندی کے فوائد بیان کر سکے
- صفائی اور باہمی اعتماد سے حسن کارکردگی کو بیان کر سکے
- مصلحت کے فوائد بیان کر سکے

مطالعہ پاکستان

حصہ دوم

تدریسی مقاصد۔ حریت فکر:

عمومی مقصد۔ طالب علم یہ جان لے کہ اسلام میں اور مسلمان قوم میں آزادی فکر کی کیا اہمیت ہے۔

خصوصی مقاصد:

- حریت فکر کا معنی و مفہوم بیان کر سکے۔
- آزادی فکر کی اہمیت بیان کر سکے۔
- خصوصاً اسلام میں آزادی اظہار رائے کی اہمیت بیان کر سکے۔
- ذہنی غلامی کے قومی سطح پر نقصانات بیان کر سکے۔
- جسمانی غلامی کے قومی سطح پر نقصانات بیان کر سکے۔

نظریہ پاکستان

عمومی مقصد۔ نظریہ پاکستان (دین اسلام) سے پوری طرح واقف ہو جائے

خصوصی مقاصد:

- نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے۔
- نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے۔

عمومی مقصد۔ نظریہ پاکستان کے تاریخی پس منظر سے [illegible] کر سکے۔

خصوصی مقاصد۔ محمد بن قاسم کے بارے میں بیان کر سکے۔

نصاب سال اول Gen III

حصہ دوم مطالعہ پاکستان کل وقت:12 گھنٹے

موضوعات

- حریت فکر

مسلمان قوم میں آزادی فکر کی تاریخ۔ مسلمانوں میں سیاسی آزادی کی اہمیت اور ضرورت۔ ذہنی وجسمانی غلامی کے نقصانات

- نظریہ پاکستان

قیام پاکستان کی اساس (دین اسلام) قیام پاکستان کی غرض و غایت۔ نظریہ پاکستان کی وضاحت۔ نظریہ پاکستان علامہ اقبال اور قائداعظم کے ارشادات کی روشنی میں

- نظریہ پاکستان کا تاریخی پہلو

محمد بن قاسم کی آمد۔ مجدد الف ثانی اور شاہ ولی اللہ کی تبلیغی خدمات، سید احمد شہید کی تحریک مجاہدین

- تعلیمی تحریکیں

علی گڑھ۔ ندوۃ العلماء۔ دیوبند۔ مدرسۃ الاسلام (سندھ) اسلامیہ کالج (پشاور) انجمن حمایت اسلام (لاہور)

- وہ بیان کر سکے کہ ہندوستان میں ہندو مسلم دو قومی نظ کیا ہے۔
- مجدد الف ثانی کی علمی خدمات بیان کر سکے
- شاہ ولی اللہ کی علمی خدمات بیان کر سکے
- مجدد الف ثانی اور شاہ ولی اللہ نے جو تبلیغ دین اور مسلمانوں میں سیاسی شعور پیدا کیا اسے بیان کر سکے۔

علمی تحریکیں

عمومی مقصد۔

- برصغیر کی علمی تحریکوں سے آگاہی حاصل ہو سکے

خصوصی مقاصد

- علی گڑھ۔ دیوبند۔ ندوۃ العلماء۔ مدرسۃ الاسلام۔ اسلامیہ کالج۔ انجمن حمایت اسلام نے تعلیم کے ذریعہ جو سیاسی شعور مسلمانوں میں پیدا کیا اسے بیان کر سکے۔
- آزادی ہند کے سلسلہ میں تحریک مجاہدین کی خدمات بیان کر سکے۔

Eng-112

FUNCTIONAL ENGLISH

Eng-112 ENGLISH

Total contact hours

Theory	64	T	P	C
Practical	0	2	0	2

AIMS At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

COURSE CONTENTS

ENGLISH PAPER "A"

1. PROSE/TEXT **16 hrs**

1.1 First eight essays of Intermediate. English Book-II

2. CLOZE TEST **4 hrs**

1.2 A passage comprising 50-100 words will be selected from the text. Every 11thword or any word for that matter will be omitted. The number of missing word will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

ENGLISH PAPER "B"

3. GRAMMAR **26 hrs**

3.1 Sentence Structure.
3.2 Tenses.
3.3 Parts of speech.
3.4 Punctuation,
3.5 Change of Narration.
3.6 One word for several
3.7 Words often confused

4. COMPOSITION **8 hrs**

4.1 Letters/Messages
4.2 Job application letter
4.3 For character certificate/for grant of scholarship
4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles
4.5 Essay writing
4.6 Technical Education, Science and Our life, Computers, Environmental Pollution, Duties of a Student. **4 hrs**

5. TRANSLATION **6 hrs**

5.1 Translation from Urdu into English.
For Foreign Students: A paragraph or a dialogue.

RECOMMENDED BOOKS

1. Intermediate English Book-II.
2. An English Grammar and Composition of Intermediate Level.
3. A Hand Book of English Students by Gatherer

Eng-112 ENGLISH

INSTRUCTIONAL OBJECTIVES

PAPER-A

1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY

1.1 Manipulate, skimming and scanning of the text.
1.2 Identify new ideas.
1.3 Reproduce facts, characters in own words
1.4 Write summary of stories

2. UNDERSTAND FACTS OF THE TEXT

2.1 Rewrite words to fill in the blanks recalling the text.
2.2 Use own words to fill in the blanks.

PAPER-B

3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING

3.1 Use rules of grammar to construct meaningful sentences containing a subject and a predicate.
3.2 State classification of time, i.e. present, past and future and use verb tense correctly in different forms to denote relevant time.
3.3 Identify function words and content words.
3.4 Use marks of punctuation to make sense clear.
3.5 ' Relate what a person says in direct and indirect forms.
3.6 Compose his writings.
3.7 Distinguish between confusing words.

4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICALSITUATIONS

4.1 Use concept to construct applications for employment, for character certificate, for grant of scholarship.
4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles
4.3 Describe steps of a good composition writing.
4.4 Describe features of a good composition.
4.5 Describe methods of composition writing.
4.6 Use these concepts to organize facts and describe them systematically in practical situation;

5. APPLIES RULES OF TRANSLATION

5.1 Describe confusion.
5.2 Describe rules of translation.
5.3 Use rules of translation from Urdu to English in simple paragraph and sentences.

Math-113

APPLIED MATHEMATICS

Math-113 APPLIED MATHEMATICS

Total contact hours	96	**T**	**P**	**C**
Theory		3	0	3

Pre-requisite: Must have completed a course of Elective Mathematics at Matric level.

AIMS After completing the course the students will be able to

1. Solve problems of Algebra, Trigonometry, vectors. Menstruation, Matrices and Determinants.
2. Develop skill, mathematical attitudes and logical perception in the use of mathematical instruments as required in the technological fields.
3. Acquire mathematical clarity and insight in the solution of technical problems.

COURSE CONTENTS

1 QUADRATIC EQUATIONS 6 Hrs

1.1 Standard Form
1.2 Solution
1.3 Nature of roots
1.4 Sum & Product of roots
1 .5 Formation
1.6 Problems

2 ARITHMETIC PROGRESSION AND SERIES 3Hrs

2.1 Sequence
2.2 Series
2.3 nth term
2.4 Sum of the first n terms
2.5 Means
2.6 Problems

3 GEOMETRIC PROGRESSION AND SERIES 3Hrs

3.1 nth term
3:2 sum of the first n terms
3.3 Means
3.4 Infinite Geometric progression
3.5 Problems

4 BINOMIAL THEOREM 6 Hrs

4.1 Factorials
4.2 Binomial Expression
4.3 Binomial Co-efficient
4.4 Statement
4.5 The General Term
4.6 The Binomial Series.
4.7 Problems

5 PARTIAL FRACTIONS 6 Hrs

5.1 Introduction
5.2 Linear Distinct Factors Case I
5.3 Linear Repeated FactorsCase II
5.4 Quadratic Distinct Factors Case III
5.5 Quadratic Repeated Factors Case IV
5.6 Problems

6 FUNDAMENTALS OF TRIGONOMETRY 6 Hrs

6.1 Angles
6.2 Quadrants
6.3 Measurements of Angles
6.4 Relation between Sexagesimal& circular system
6.5 Relation between Length of a Circular Arc & the Radian Measure of its central Angle
6.6 Problems

7 TRIGONOMETRIC FUNCTIONS AND RATIOS 6 Hrs

7.1 trigonometric functions of any angle
7.2 Signs of trigonometric Functions
7.3 Trigonometric Ratios of particular Angles
7.4 Fundamental Identities
7.5 Problems

8 GENERAL INDENTITIES 6 Hrs

8.1 The Fundamental Law
8.2 Deductions
8.3 Sum & Difference Formulae
8.4 Double Angle Identities
8.5 Half Angle Identities
8.6 Conversion of sum or difference to products
8.7 Problems

9 SOLUTION OF TRIANGLES 6 Hrs

9.1 The law of Sines
9.2 The law of Cosines
9.3 Measurement of Heights & Distances
9.4 Problems

10 MENSURATION OF SOLIDS 30 Hrs

10.1 Review of regular plane figures and Simpson's Rule
10.2 Prisms
10.3 Cylinders
10.4 Pyramids
10.5 Cones
10.6 Frusta
10.7 Spheres

11 VECTORS 9 Hrs

11.1 Sealers & Vectors
11.2 Addition & Subtraction
11.3 The unit Vectors I, j, k
11.4 Direction Cosines
11.5 Sealer or Dot Product
11.6 Deductions
11.7 Dot product in terms of orthogonal components
11.8 Deductions
11.9 Analytic Expression for a x b.
11.10 Problems.

12 MATRICES AND DETERMINANTS 9 Hrs

12.1 Definition of Matrix
12.2 Rows & Columns
12.3 Order of a Matrix
12.4 Algebra of Matrices
12.5 Determinants
12.6 Properties of Determinants
12.7 Solution of Linear Equations
12.8 Problems

REFERENCE BOOKS

1. Ghulam Yasin Minhas - Technical Mathematics Vol-I, Ilmi Kitab Khana Lahore.
2. Prof. Riazali Khan - Polytechnic Mathematic Series Vol I & II, Majeed Sons, Faisalabad
3. Prof. Sana Ullah Bhatti - A Text Book of Algebra and Trigonometry, Punjab Text Book Board, Lahore.

Math-113 APPLIED MATHEMATICS-I

INSTRUCTIONAL OBJECTIVES

1 USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATIONS

1.1 Define a standard quadratic equation.
1.2 Use methods of factorization and method of completing the square for solving the equations.
1.3 Derive quadratic formula.
1.4 Write expression for the discriminate
1.5 Explain nature of the roots of a quadratic equation.
1.6 Calculate sum and product of the roots.
1.7 Form a quadratic equation fromthe given roots.
1.8 Solve problems involving quadratic equations.

2 UNDERSTAND APPLY CONCEPT OF ARITHMETIC PROGRESSION AND SERIES

2.1 Define an Arithmetic sequence and a series
2.2 Derive formula for the nth term of an A.P.
2.3 Explain Arithmetic Mean between two given numbers
2.4 Insert n Arithmetic means between two numbers
2.5 Derive formulas for summation of an Arithmetic series
2.6 Solve problems on Arithmetic Progression and Series

3 UNDERSTAND GEOMETRIC PROGRESSION AND SERIES

3.1 Define a geometric sequence and a series.
3.2 Derive formula for nth term of a G.P.
3.3 Explain geometric mean between two numbers.
3.4 Insert n geometric means between two numbers.
3.5 Derive a formula for the summation of geometric Series.
3.6 Deduce a formula for the summation of an infinite G.P.
3.7 Solve problems using these formulas.

4 EXPAND AND EXTRACT ROOTS OF A BINOMIAL

4.1 State binomial theorem for positive integral index.
4.2 Explain binomial coefficients: (n,0), (n,1)…….(n,r),…….(n,n)
4.3 Derive expression for the general term.
4.4 Calculate the specified terms.
4.5 Expand a binomial of a given index. -
4.6 Extract the specified roots
4.7 Compute the approximate value to a given decimal place.
4.8 Solve problems involving binomials.

5 RESOLVE A SINGLE FRACTIONINTO PARTIALFRACTIONS USINGDIFFERENT METHODS.

5.1 Define a partial fraction, a proper and an improper fraction.
5.2 Explain all the four types of partial fractions.

5.3 Set up equivalent partial fractions for each type.
5.4 Explain the methods for finding constants involved.
5.5 Resolve a single fraction into partial fractions.
5.6 Solve problems involving all the four types.

6 UNDERSTAND SYSTEMS OF MEASUREMENT OF ANGLES.

6.1 Define angles and the related terms.
6.2 Illustrate the generation of angle.
6.3 Explain sex agesimal and circular systems for the measurement of angles
6.4 Derive the relationship between radian and degree.
6.5 Convert radians to degrees and vice versa.
6.6 Derive a formula for the circular measure of a central angle.
6.7 Use this formula for solving problems.

7 APPLY BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRICFUNCTIONS

7.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a right triangle.
7.2 Derive fundamental identities.
7.3 Find trigonometric ratios of particular angles.
7.4 Draw the graph of trigonometric functions.
7.5 Solve problems involving trigonometric functions.

8 USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICALPROBLEMS

8.1 List fundamental identities
8.2 Prove the fundamental law
8.3 Deduce important results
8.4 Derive-sum and difference formulas
8.5 Establish half angle, double angle & triple angle formulas
8.6 Convert sum or difference into product& vice versa
8.7 Solve problems

9 USE CONCEPTS, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES

9.1 Define angle of elevation and angle of depression.
9.2 Prove the law of sins and the law of cosines.
9.3 Explain elements of a triangle.
9.4 Solve triangles and the problems involving heights and distances.

10 USE PRINCIPLES OF MENSTRUATION IN FINDING SURFACES, VOLUMEAND WEIGHTS OF SOLIDS.

10.1 Define menstruation of plane and solid figures
10.2 List formulas for perimeters & areas of plane figure.
10.3 Define pyramid and cone.
10.4 Define frusta of pyramid and cone.
10.5 Define a sphere and a shell.

10.6 Calculate the total surface and volume of each type of solid.
10.7 Compute weight of solids.
10.8 Solve problems of these solids.

11. USE THE CONCEPT AND PRINCIPLES OF VECTORS IN SOLVINGTECHNOLOGICAL PROBLEMS.

11.1 Define vector quantity.
11.2 Explain addition and subtraction of vector
11.3 Illustrate unit vectors I, j, k.
11.4 Express a vector in the component form.
11.5 Explain magnitude, unit vector, direction consigns of a vector.
11.6 Derive analytic expression for dot product and cross product of two vectors.
11.7 Deduce conditions of perpendicularly and parallelism of two vectors.
11.8 Solve problems

12. USE THE CONCEPT OFMATRICES & DETERMINANTS IN SOLVING TECHNOLOGICAL PROBLEMS

12.1 Define a matrix and a determinant.
12.2 List types of matrices.
12.3 Define transpose, ad joint and inverse of a matrix.
12.4 State properties of determinants.
12.5 Explain basic concepts.
12.6 Explain algebra of matrices.
12.7 Solve linear equation by matrices.
12.8 Explain the solution of a determinant.
12.9 Use Crammers Rule for solving linear equations

Phy-122

APPLIED PHYSICS

Phy-122 APPLIED PHYSICS

Total Contact Hours

		T	P	C
Theory	32			
Practical	96	1	3	2

AIMS: The students will be able to understand the fundamental principles and concept of physics, use these to solve problems in practical situations/technical courses and understand concepts to learn advance physics/technical courses,

COURSE CONTENTS

1 MEASUREMENTS. 2 Hrs

1.1 Fundamental units and derived units
1.2 Systems of measurement and S.I. units
1.3 Concept of dimensions, dimensional formula
1.4 Conversion from one system to another
1.5 Significant figures

2. SCALARS AND VECTORS. 4 Hrs

2.1 Revision of head to tail rule
2.2 Laws of parallelogram, triangle and polygon of forces
2.3 Resolution of a vector
2.4 Addition of vectors by rectangular components
2.5 Multiplication of two vectors, dot product and cross product

3. MOTION 4 Hours

3.1 Review of laws and equations of motion
3.2 Law of conservation of momentum
3.3 Angular motion
3.4 Relation between linear and angular motion
3.5 Centripetal acceleration and force
3.6 Equations of angular motion

4. TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA

4.1 Torque
4.2 Centre of gravity and centre of mass
4.3 Equilibrium and its conditions
4.4 Torque and angular acceleration
4.5 Rotational inertia

5. WAVE MOTION 5 Hrs

5.1 Review Hooke's law of elasticity,
5.2 Motion under an elastic restoring force.
5.3 Characteristics of simple harmonic motion

5.4 S.H.M. and circular motion
5.5 Simple pendulum
5.6 Wave form of S.H.M.
5.7 Resonance
5.8 Transverse vibration of a stretched string

6. SOUND **5 Hrs**

6.1 Longitudinal waves
6.2 Intensity, loudness, pitch and quality of sound
6.3 Units of Intensity of level and frequency response of ear
6.4 Interference of sound waves silence zones, beats
6.5 Acoustics
6.6 Doppler effect

7. LIGHT **5 Hrs**

7.1 Review laws of reflection and refraction
7.2 Image formation by mirrors and lenses
7.3 Optical instruments
7.4 Wave theory of light
7.5 Interference, diffraction, polarization of light waves
7.6 Applications of polarization in sunglasses, optical activity and stress analysis

8. OPTICAL FIBER **2 Hrs**

8.1 Optical communication and problems
8.2. Review total internal reflection and critical angle
8.3 Structure of optical fiber
8.4 Fiber material and manufacture
8.5 Optical fiber - uses.

9. LASERS **3 Hrs**

9.1 Corpuscular theory of light
9.2 Emission and absorption of light
9.3 Stimulated absorption and emission of light
9.4 Laser principle
9.5 Structure and working of lasers
9.6 Types of lasers with brief description.
9.7 Applications (basic concepts)
9.8 Material processing
9.9 Laser welding
9.10 Laser assisted machining
9.11 Micro machining
9.12 Drilling scribing and marking
9.13 Printing
9.14 Lasers in medicine

RECOMMENDED BOOKS

1. Tahir Hussain, Fundamentals of Physics Vol-I and II
2. Farid Khawaja, Fundamentals of Physics Vol-I and II
3. Wells and Slusher, Schaum's Series Physics.
4. Nelkon and Oyborn, Advanced Level Practical Physics
5. Mehboob Ilahi Malik and Inam-ul-Haq, Practical Physics
6. Wilson, Lasers - Principles and applications
7. M. Aslam Khan and M. Akram Sandhu, Experimental Physics Note Book

Phy-122 APPLIED PHYSICS

INSTRUCTIONAL OBJECTIVES

1 USE CONCEPTS OF MEASUREMENT TO PRACTICAL SITUATIONS AND TECHNOLOGICAL PROBLEMS

1. 1 Write dimensional formulae for physical quantities

1.2 Derive units using dimensional equations

1.3 Convert a measurement from one system to another

1.4 Use concepts of measurement and significant figures in problem solving.

2 USE CONCEPTS OF SCALARS AND VECTORS IN SOLVING PROBLEMS INVOLVING THESE CONCEPTS

2.1 Explain laws of parallelogram, triangle and polygon of forces

2.2 Describe method of resolution of a vector into components

2.3 Describe method of addition of vectors by rectangular components

2.4 Differentiate between dot product and cross product of vectors

2.5 Use the concepts in solving problems involving addition resolution and multiplication of vectors

3 USE THE LAW OF CONSERVATION OF MOMENTUM AND CONCEPTS OF ANGULAR MOTION TO PRACTICAL SITUATIONS

3.1 Use law of conservation' of momentum to practical/technological problems

3.2 Explain relation between linear and angular motion

3.3 Use concepts and equations of angular motion to solve relevant technological problems

4 USE CONCEPTS OF TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA TO PRACTICAL SITUATION/PROBLEMS

4.1 Explain Torque

4.2 Distinguish between Centre of gravity and centre of mass

4.3 Explain rotational Equilibrium, and its conditions

4.4 Explain. Rotational Inertia giving examples

4.5 Use the above concepts in solving technological problems.

5 USE CONCEPTS OR WAVE MOTION IN SOLVING RELEVANT PROBLEMS

5.1 Explain Hooke's Law of Elasticity

5.2 Derive formula for Motion under an elastic restoring force

5.3 Derive formulae for simple harmonic motion and simple pendulum

5.4 Explain wave form with reference to S.H.M. and circular motion

5.5 Explain Resonance

5.6 Explain Transverse vibration of a stretched 'string

5.7 Use the above concepts and formulae of S.H.M. to solve relevant problems.

6 UNDERSTAND concepts OF SOUND

6.1 Describe longitudinal wave and its propagation

6.2 Explain the concepts: Intensity, loudness, pitch and quality of sound

6.3 Explain units of Intensity of level and frequency response of ear

6.4 Explain phenomena of silence zones, beats

6.5 Explain Acoustics of buildings.

6.6 Explain Doppler Effect giving mathematical expressions.

7 USE THE CONCEPTS OF GEOMETRICAL OPTICS TO MIRRORS AND LENSES

7.1 Explain laws of reflection and refraction

7.2 Use mirror formula to solve problems

7.3 Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, camera and sextant.

8 UNDERSTAND WAVE THEORY OF LIGHT

8.1 Explain wave theory of light

8.2 Explain phenomena of interference, diffraction, polarization of light waves

8.3 Describe uses of polarization given in the course contents.

9 UNDERSTAND THE STRUCTURE, WORKING AND USES OF OPTICAL FIBER

9.1 Explain the structure of the Optical Fiber

9.2 Explain its principle of working

9.3 Describe use of optical fiber in industry and medicine.

Phy-122 APPLIED PHYSICS

LIST OF PRACTICALS

1. Draw graphs representing the functions:

a) $y=mx$ for $m=0, 0.5, 1, 2$

b) $y=x^2$

c) $y = l/x$

2. Find the volume of a given solid cylinder using venire calipers.
3. Find the area of cross-section of the given wire using micrometer screw gauge.
4. Prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers trolley
5. Verify law of parallelogram of forces using Grave-sands apparatus.
6. Verify law of triangle of forces and Lami's theorem
7. Determine the weight of a given body using
   a) Law of parallelogram of forces
   b) Law of triangle of forces
   c) Lami's theorem
8. Verify law of polygon of forces using Grave-sands apparatus.
9. Locate the position and magnitude of resultant of like parallel forces.
10. Determine the resultant of two unlike parallel forces.

II. Find the weight of a given body using principle of moments.

12. Locate the centre of gravity of regular and irregular shaped bodies.
13. Find Young's Modules of Elasticity of a metallic wire.
14. Verify Hooke's Law using helical spring.
15. Study of frequency of stretched string with length.
16. Study of variation of frequency of stretched string with tension.
17. Study resonance of air column in resonance tube and find velocity of sound.
18. Find the frequency of the given tuning fork using resonance tube.
19. Find velocity of sound in rod by Kundt's tube

20, Verify rectilinear propagation of light and study shadow formation.

21. Study effect of rotation of plane mirror on reflection.
22. Compare the refractive indices of given glass slabs.
23. Find focal length of concave mirror by locating centre of curvature.
24. Find focal length of concave mirror by object and image method
25. Find focal length of concave mirror with converging lens.
26. Find refractive index of glass by apparent depth.
27. Find refractive index of glass by spectrometer.
28. Find focal length of converging lens by plane mirror.
29. Find focal length of converging lens by displacement method.
30. Find focal length of diverging lens using converging lens.
31. Find focal length of diverging lens using concave mirror.
32. Find angular magnification of an astronomical telescope.
33. Find angular magnification of a simple microscope (Magnifying Glass)
34. Find angular magnification of a compound microscope.
35. Study working and structure of camera.
36. Study working and structure of sextant.
37. Compare the different scales of temperature and verify the conversion formula.
38. Determine the specific heat of lead shots.

39. Find the coefficient of linear expansion of a metallic rod.
40. Find the heat of fusion of ice.
41. Find the heat of vaporization.
42. Determine relative humidity using hygrometer:

Ch-112

APPLIED CHEMISTRY

Ch-112 APPLIED CHEMISTRY

T	P	C
1	3	2

Total Contact Hours

Theory **32**

Practical **64**

Pre-requisite: The student must have studied the subject of elective chemistry at secondary, school level.

AIMS After studying this course a student will be able to;

1. Understand the significance and role of chemistry in the development of modern technology.
2. Become acquainted with the basic principles of chemistry as applied in the study of relevant Technology.
3. Know the scientific methods for production, properties and use of materials of industrial & .technological significance.
4. Gains skill for the efficient conduct of practical's in a Chemistry lab.

COURSE CONTENTS

1 INTRODUCTION AND FUNDAMENTAL CONCEPTS **2 Hrs**

1.1 Orientation with reference to this technology

1.2 Terms used & units of measurements in the study of chemistry

1.3 Chemical Reactions & their types

2 ATOMIC STRUCTURE **2 Hrs**

2.1 Sub-atomic particles

2.2 Architecture of atoms of elements, Atomic No. & Atomic Weight

2.3 The periodic classification of elements periodic law

2.4 General characteristics of a period and group

3 CHEMICAL BOND **2 Hrs**

3.1 Nature of chemical Bond

3.2 Electrovalent bond with examples

3.3 Covalent Bond (Polar and Non-polar, sigma & Pi Bonds with examples

3.4 Co-ordinate Bond with examples

4 WATER **2 Hrs**

4.1 Chemical nature and properties.

4.2 Impurities

4.3 Hardness of water (types, causes & removal)

4.4 Scales of measuring hardness (Degrees Clark

4.5 Boiler feed water, scales & treatment

4.6 Sea-water desalination, sewage treatment

5 ACIDS, BASES AND SALTS **2 Hrs**

5.1 Definitions with examples

5.2 Properties, their strength, basicity & Acidity

5.3 Salts and their classification with examples

5.4 pH-value and scale

6 OXIDATION & REDUCTION 2 Hrs

6.1 The process, definition& examples
6.2 Oxidizing and reducing agents
6.3 Oxides and their classifications

7 NUCLEAR CHEMISTRY 2 Hrs

7.1 Introduction
7.2 Radioactivity (alpha, beta and gamma rays)
7.3 Half life process
7.4 Nuclear reaction & transformation of elements

8 CEMENT 2 Hrs

8.1 Introduction
8.2 Composition and manufacture
8.3 Chemistry of setting and hardening
8.4 Special purpose cements

9 GLASS 2 Hrs

9.1 Composition and raw material
9.2 Manufacture
9.3 Varieties and uses

10 PLASTICS AND POLYMERS 2 Hrs

10.1 Introduction and importance
10.2 Classification
10.3 Manufacture
10.4 Properties and uses

11 PAINTS, VARNISHES AND DISTEMPER 2 Hrs

11.1 Introduction
11.2 Constituents
11.3 Preparation and uses

12 CORROSION 2 Hrs

12.1 Introduction with causes
12.2 Types of corrosion
12.3 Rusting of iron
12.4 Protective measures against-corrosion

13 REFRACTORY MATERIALS AND ABRASIVE 2 Hrs

13.1 Introduction to Refractories
13.2 Classification of Refractories
13.3 Properties and Uses
13.4 Introduction to Abrasives
13.5 Artificial and Natural Abrasives and their uses

14 ALLOYS **2 Hrs**

14.1 Introduction with need

14.2 Preparation and Properties

14.3 Some Important alloys and their composition

14.4 Uses

15 FUELS AND COMBUSTION **2 Hrs**

15.1 Introduction of fuels

15.2 Classification of fuels

15.3 Combustion

15.4 Numerical Problems of Combustion

16 LUBRICANTS **1 Hr**

16.1 Introduction.

16.2 Classification.

16.3 Properties of lubricants.

16.4 Selection of lubricants:

17 POLLUTION **1 Hr**

17.1 The problem and its dangers.

17.2 Causes of pollution.

17.3 Remedies to combat the hazards of pollution.

BOOKS RECOMMENDED

1. Text Book of Intermediate Chemistry (I & II)
2. Ilmi Applied Science by Sh. Atta Muhammad
3. Polytechnic Chemistry by J. N. Reedy Tata McGraw Hill (New Delhi)
4. Chemistry for Engineers by P.C. Jain (New Delhi, India)

Ch-112 APPLIED CHEMISTRY

INSTRUCTIONAL OBJECTIVES

1 UNDERSTAND THE SCOPE, SIGNIFICANCE AND FUNDAMENTAL ROLE OF THE SUBJECT

1.1 Define chemistry and its important terms
1.2 State the units of measurements in the study of chemistry
1.3 Write chemical formula of common compounds
1.4 Describe types of chemical reactions with examples

2 UNDERSTAND THE STRUCTURE OF ATOMS AND ARRANGEMENT OF SUB ATOMIC PARTICLES IN THE ARCHITECTURE OF ATOMS

2.1 Define atom.
2.2 State the periodic law of elements.
2.3 Describe the fundamental sub atomic particles
2.4 Distinguish between atomic ho. and mass no.; isotopes and isobars
2.5 Explain the arrangements of electrons in different shells and sub energy levels
2.6 Explain the grouping and placing of ^elements' in the periodic table

3 UNDERSTAND THE NATURE OF CHEMICAL LBOUND

3.1 Define chemical bond
3.2 Describe the nature of chemical bond
3.3 Differentiate .between electrovalent an^ covalent bonding
3.4 Explain the formation of polar and non polar, sigma and pi-bond with examples
3.5 Describe the nature of coordinate bond with examples

4 UNDERSTAND THE CHEMICAL NATURE OF WATER

4.1 Describe the chemical nature of water with its formula
4.2 Describe the general impurities present in water
4.3 Explain the causes and methods to removing hardness of water
4.4 Express hardness .in different units like mg/ liter, p.p.m, degrees Clark and degrees French
4.5 Describe the formation and nature of scales in boiler feed water
4.6 Explain the method for the treatment of scales
4.7 Explain the sewage treatment and desalination of sea water

5 UNDERSTAND THE NATURE OF ACIDS, BASES AND SALTS

5.1 Define acids, bases and salts with examples
5.2 State general properties of acids and bases
5.3 Differentiate between acidity and basicity and use the related terms
5.4 Define salts, state their classification with examples
5.5 Explain p-H value of solution and pH scale

6 UNDERSTAND THE PROCESS OF OXIDATION AND REDUCTION

6.1 Define oxidation
6.2 Explain the oxidation process with examples
6.3 Define reduction
6.4 Explain reduction process with examples
6.5 Define oxidizing and reducing-agents and give it least six examples of each
6.6 Define oxides

6.7 Classify the oxides and give example

7 UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY

7.1 Define nuclear chemistry and radio activity
7.2 Differentiate between alphas, Beta and Gamma particles
7.3 Explain hall-life process
7.4 Explain at least six nuclei reactions resulting in the transformation of some elements
7.5" State important uses of isotopes

8 UNDERSTAND THE MANUFACTURE, SETTING AND HARDENING CEMENT

8.1 Define port land cement and give its composition
8.2 Describe the method of manufacture
8.3 Describe the chemistry of setting and hardening of cement
8.4 Distinguish between ordinary and special purpose cement

9 UNDERSTAND THE PROCESS OF MANUFACTURE OF GLASS.

9.1 Define glass
9.2 Describe its composition and raw materials
9.3 Describe the manufacture of glass
9.4 explain its varieties and uses

10 UNDERSTAND THE NATURE AND IMPORTANCE OF PLASTICS POLYMERS

10.1. Define plastics and polymers
10.2 Explain the mechanism of polymerization
10.3 Describe the preparation and uses of some plastics/polymers

11 KNOW THE.CHEMISTRY OF PAINTS, VARNISHES AND DISTEMPERS

11.1 Define paints, varnishes and distemper
11.2 State composition of each
11.3 State methods of preparation of each and their uses

12 UNDERSTAND THE PROCESS OF CORROSION WITH ITS CAUSES AND TYPES

12.1 Define corrosion
12.2 Describe different types of corrosion
12.3 State the causes of corrosion
12.4 Explain the process of rusting of iron
J2.5 Describe methods to prevent/control corrosion

13 UNDERSTAND THE NATURE OF REFRACTORY MATERIALS AND ABRASIVE

13.1 Define refractory materials
13.2 Classify refractory materials
13.3 Describe properties and uses of refractories
13.4 Define abrasive.
13.5 Classify natural and artificial abrasives
13.6 Describe uses of abrasives

14 UNDERSTAND THE NATURE AND IMPORTANCE OF ALLOYS

14.1 Define alloy

14.2 Describe different methods for the preparation of alloys

14.3 Describe important properties of alloys

14 4 Enlist some important alloys with their composition, properties and uses

15 UNDERSTAND THE NATURE OF FUELS AND THEIR COMBUSTION

15.1 Define fuels

15.2 Classify fuels and make distinction of solid, liquid & gaseous fuels

15.3 Describe important Fuels

15.4 Explain combustion

15.5 Calculate air quantities in combustion, gases

16 UNDERSTAND THE NATURE OF LUBRICANTS.

16.1 Define a lubricant

16.2 Explain the uses of lubricants

16.3 Classify lubricants and cite examples

16.4 State important properties of oils, greases and solid lubricants

16.5 State the criteria for the selection of lubricant tor, particular purpose/job

17 UNDERSTAND THENATURE OF POLLUTION

17.1 Define Pollution (air. water, food)

17.2 Describe the causes of environmental pollution.

17.3 Enlist some common pollutants.

17.4 Explain methods to prevent pollution

MT-117

WORKSHOP PRACTICE - I

MT-117 WORKSHOP PRACTICE - I

Total Contact Hours		**T**	**P**	**C**
Theory:	**64 Hrs**	**2**	**15**	**7**
Practical:	**480 Hrs**			

Pre-requisites: None

AIMS: The students will familiarize with the Tools, Equipment, Machines used in the Metal work, Welding & Forging, Wood Work, Foundry and Basic machine shop. The student will achieve the Basic skills in the above fields by preparing specific jobs in each part of the subject.

Course Contents:

1.	**A Metal work**	**12 Hrs**
2.	**B Wood Work**	**13 Hrs**
3.	**C Welding and Forging**	**13 Hrs**
4.	**D Foundry**	**13 Hrs**
5.	**E Basic Machine Shop**	**13 Hrs**
		Total: 64 Hrs

Detail of Contents:

A) Metal Work

1. Introduction To Metal Work and Metal Working Tools **1 Hr**

1.1 Observe safety precautions and proper care of Metal working tools and machines

2. Kinds of Tools and Machines **11 Hrs**

2.1 Hand tools
- 2.1.1 Measuring tools
- 2.1.2 Layout tools
- 2.1.3 Cutting tools
- 2.1.4 Chisels
- 2.1.5 **Files**
- 2.1.6 **Hacksaws**
- 2.1.7 Drills & Reamers
- 2.1.8 Taps, Taping and Threading dies

2.2 Machines
- 2.2.1 Drilling machines
- 2.2.2 Power Hacksaw
- 2.2.3 Bending machines
- 2.2.4 Rolling machine
- 2.2.5 Shearing machine

2.3 Fasteners
- 2.3.1 Introduction to Fasteners
- 2.3.2 Screws, Nuts, Bolts, Rivets,
- 2.3.2 Types and applications of related tools

B) Wood Work

3. Wood Working Tools — 4 Hrs

3.1 Wood working shop orientation
3.2 Impact Tools
3.3 Measuring tools
3.4 Cutting tools
3.5 Marking tools
3.6 Holding tools

4. Wood Working Machine — 3 Hrs

4.1 Introduction
4.2 Radial saw
4.3 Circular saw
4.4 Band saw
4.5 Jointer and planner
4.6 Wood turning lathe
4.7 Jig saw
4.8 Safety precautions for above wood working machine

5. Wood Cuts and Wood Joints, Wood Finishing and Polishing — 6 Hrs

5.1 Types and uses of wood cuts
5.2 Classification and uses of wood joints.
5.3 Making wood cuts and wood joints.
5.4 Wood glue and wood fastener.
5.5 Kind and seasoning of wood
5.6 Importance of wood finishing and polishing
5.7 Classify abrasive sheets according to the size, nature of abrasive and their international Grades.
5.8 Sanding application and sanding machine
5.9 Pattern filling and its application
5.10 Polishing of wood and care in use of polishing brush

C) Welding and Forging

6. Welding shop and Forging shop Machinery, Tools and Equipments — 4 Hrs

6.1 Definition of welding
6.2 Welding Processes
- 6.2.1 Pressure welding
- 6.2.2 Fusion welding process

6.3 Types of pressure welding process
- 6.3.1 Forge welding
- 6.3.2 Resistance welding
  - 6.3.2.1 Types of Resistance welding

6.4 Types of Fusion welding
- 6.4.1 Oxy acetylene gas welding
- 6.4.2 Arc welding
- 6.4.3 **Thermit** welding
- 6.4.4 TIG welding
- 6.4.5 MIG welding
- 6.4.6 Submerged Arc welding

7. Detail of Fusion Welding (Oxy acetylene gas welding, Arc welding) — 4 Hrs

7.1 Oxy acetylene gas welding List of Oxy acetylene gas welding tools/equipment with their uses
7.2 Arc welding

7.2.1 Introduction to Arc welding machine
7.2.2 **Arc welding tools equipments with their uses**

7.3 Welding Materials
7.3.1 Flux
7.3.2 Types of filler rod
7.3.3 Types of Electrode

7.4 Safety method**s** in welding shop
7.4.1 Flash back and its remedy
7.4.2 Back fire and its remedy

7.5 Types of welded joints

7.6 Welding Defects

8. Forging **5 Hrs**

8.1 Introduction to Forging
8.2 Forging tools Equipments
8.2.1 Machine
8.2.2 Furnaces
8.3 Classification of forging
8.3.1 Hand Forging
8.3.2 Machine Forging
8.4 Forging operations
8.4.1 Drawing Down
8.4.2 Up Setting
8.4.3 Cutting
8.4.4. Swaging
8.4.5 Punching
8.4.6 Twisting

D) Foundry

9. Foundry **5 Hrs**

9.1 **Introduction to foundry and Shop safety Procedure**.
9.2 **Castings, types and basic steps in casting**
9.3 **Pattern and its types**

10. Foundry tools and equipment **5 Hrs**

10.1 Molding hand tools
10.2 Molding machines
10.3 Sand mixing machine
10.4 Shot blasting machines
10.5 Furnaces

11. Foundry sand **5 Hrs**

11.1 Green sand and its composition
11.2 Dry sand and its composition
11.3 Characteristics of foundry sand
11.4 Parting sand
11.5 Facing sand

E) Basic Machine Shop

12. Lathe construction **13 Hrs**

12.1 Parts of lathe
12.1.1 Lathe accessories
12.2 Lathe cutting tools and materials

MT-117 WORKSHOP PRACTICE– I

Instructional Objectives:

A) Metal Work

1. Introduction and layout To Metal Work and Metal Working Tools

1.1 Observe safety precautions, **importance** and proper care of Metal working tools and machines

2. Kinds of Tools and Machines

2.1 Understand Metal Working Hand tools
- 2.1.1 Classify Metal Working Measuring tools
- 2.1.2 Describe Layout tools and Practice
- 2.1.3 Describe Cutting tools and Practice
- 2.1.4 Describe Chisels and Chiseling
- 2.1.5 Describe Files and Filing
- 2.1.6 Describe Hacksaws and Hack sawing
- 2.1.7 Describe Drills, Drilling and Reamers
- 2.1.8 Describe Taps, Taping and Threading dies

2.2 Understand Metal Working Machines
- 2.2.1 Explain Drilling machines
- 2.2.2 Explain Power Hacksaw
- 2.2.3 Explain Bending machines
- 2.2.4 Explain Rolling machine**s**
- 2.2.5 Explain Shearing machine**s**

2.3 Understand Fasteners
- 2.3.1 Introduction to Fasteners
- 2.3.2 Explain Types of Screws, Nuts, Bolts, Rivets
- 2.3.2 Explain Types and applications of related tools

B) Wood Work

3. Wood Working Tools

3.1 Introduction **and layout of** Wood Workshop
- 3.1.1 Describe the basic concept of wood work shop and its importance for pattern making.
- 3.1.2 Observe safety precautions and proper care of wood working hand tools

3.2 Describe the use of Impact Tools

3.3 Describe the use of Measuring tools

3.4 Describe the use of Cutting tools
- 3.4.1 Describe sharpening of wood cutting tools

3.5 Describe the use of Marking tools

3.6 Describe the use of Holding tools

4. Operation of Wood Working Machine

4.1 Identify all wood working machines
- 4.1.1 Classify wood working machine according to their uses

4.2 **Operate** Radial saw

4.3 **Operate** Circular saw

4.4 **Operate** Band saw

4.5 **Operate** Jointer and planner

4.6 **Operate** Wood turning lathe

4.7 **Operate** Jig saw

4.8 Observe Safety precautions for above wood working machine

5. Explain Wood Cuts and Wood Joints, Wood Finishing and Polishing

5.1 Describe Types of joints and wood cuts
5.2 Describe the use of wood joints
5.3 Select the appropriate joints for the given wood
5.4 Manipulate wood fasteners and glues
5.5 Describe the kinds of wood, their classification and uses
  5.5.1 Describe seasoning methods of wood
5.6 Describe importance of wood finishing and polishing
5.7 Classify abrasive sheets according to the size of grit
  5.7.1 Classify abrasive sheets according to the nature of abrasive.(Aluminum Oxide and silicon)
  5.7.2 Use of abrasive sheets, baking process, belt making, fitting and their international grades
5.8 Describe sanding and sanding machine
  5.8.1 Process of manual sanding
  5.8.2 Process of machine sanding (Flat belt sanding, Drum sanding, Disk Sanding)
  5.8.3 Selection of cutting speed and tension for machine sanding process
  5.8.4 Describe types of pattern
  5.8.5 State methods of pattern application
  5.8.6 Describe polishing (Grain making), types of function and care in use of polishing brush

C) Welding and Forging

6. Introduction of Welding and Forging shop Machinery, Tools and Equipments

6.1 Define welding
6.2 Describe Welding Processes
  6.2.1 Describe Pressure welding
  6.2.2 Describe Fusion welding process
6.3 Describe Types of pressure welding process
  6.3.1 Describe Forge welding
  6.3.2 Describe Resistance welding of Spot welding, Seam welding, Flash welding
6.4 Describe Types of Fusion welding
  6.4.1 Describe Oxy acetylene gas welding
  6.4.2 Describe **shielded metal** Arc welding (SMAW)
  6.4.3 Describe **Thermit** welding
  6.4.4 Describe TIG welding
  6.4.5 Describe MIG welding
  6.4.6 Describe Submerged Arc welding
  6.4.7 Uses of all above welding processes

7. Understand the use of Fusion Welding Tools (Oxy acetylene gas welding, Arc welding)

7.1 Demonstrate oxy-acetylene gas welding
  7.1.1 **Enlist and describe** Tools and equipments
  7.1.2 Describe the function and proper uses of oxy-acetylene gas welding
  7.1.3 Demonstrate the pressure regulators function, Oxygen Cylinder, acetylene cylinder, injector and non injector type of blow pipe
7.2 **Define** the use of Arc welding machines and equipments
  7.2.1 Describe the function of step down transformer.
  7.2.2 Describe the function of welding tools and their uses
  7.2.3 Identification of Arc welding and their uses.
  7.2.4 Describe the arc welding processes
7.3 Describe Welding **consumable** Materials

7.3.1 Definition of Flux, its uses and advantages
7.3.2 Describe types of filler rod
7.3.3 State types of Electrode

7.4 Apply the safety methods in welding shop
7.4.1 Describe the flash back, causes **and remedies** of flash back
7.4.2 Explain the back fire, its causes and how to avoid
7.4.3 Explain the safety precautions applied during Arc welding, gas welding, **forge welding** and grinding

7.5 Describe Types of weld and welded joint
7.5.1 Types of weld
7.5.2 Types of welded joint

7.6 Describe the welding defects.
7.5.1 Lack of penetration
7.5.2 Slag inclusion
7.5.3 Undercut
7.5.4 Blow holes

8. Forging Operation

8.1. Describe the forging
8.1.1 Difference between hot and cold forging

8.2 Understand the forging tools and equipment
8.2.1 Explain the working procedure of forge furnace and name its parts
8.2.2 Identify the forging equipments, tools and their uses
8.2.3 Describe the proper use of equipments and tools
8.2.4 Explain the building and maintaining the forge fire
8.2.5 Describe the different forge fuels

8.3 Understand the forging processes
8.3.1 Describe hand forging and machine forging
8.3.2 Describe the advantages of forging
8.3.3 Explain safety rules applied **in** forging shop

8.4 Describe the forging operations
8.4.1 Cutting of hot metal with chisel
8.4.2 Cutting of hot metal with hardy
8.4.3 Explain the drawing down and up setting process
8.4.4 Demonstrate the drawing down operations and use of flatter
8.4.5 Demonstrate punching and twisting operations
8.4.6 Describe the **fullering** and swaging .Apply the proper tools for swaging operation

D) Foundry

9. Foundry

9.1 Introduction to Shop safety procedure.

9.2 **Explain casting, types and basic steps in casting process**

9.3 Describe Pattern
9.3.1 Describe types of pattern
9.3.2 Describe pattern materials

10. Foundry tools and equipment

10.1 Describe Molding hand tools
10.2 Describe Jolting and Squeezing Molding machines
10.3 **Describe sand Muller**
10.4 Describe Sand and Shot blasting machines
10.5 Describe Pit Furnaces and Tilting Furnaces

11. Foundry sand

11.1 Describe Green sand and its composition
11.2 Describe Dry sand and its composition
  11.2.1 Binders for foundry sand
  11.2.2 Describe preparation of sand for CO_2 molding process
11.3 Describe Characteristics of foundry sand
11.4 Describe Parting sand
11.5 Describe Facing sand

E) Basic Machine Shop

12. Lathe construction

12.1 List the parts of Lathe
  12.1.1 Explain the function of each part
  12.1.2 Name the "Lathe accessories"
  12.1.3 Describe the use of each accessory
12.2 List the materials used for cutting tools
  12.2.1 Describe the characteristics of each material
  12.2.2 Name the types of cutting tools according to their use.
12.3 Cutting speed and feed
  12.3.1 Define cutting speed, feed and depth of cut for lathe work
  12.3.2 Describe calculations of cutting speed
12.4 List the lathe operations
  12.4.1 Define Centering of work piece on four jaws independent chuck
  12.4.2 Describe the importance of centering the work piece
  12.4.3 Define facing
  12.4.4 Describe the method of facing a work piece held in a chuck
  12.4.5 Define straight turning
  12.4.6 Describe the method of rough and finish turning
  12.4.7 Define step turning
  12.4.8 Define shoulder
  12.4.9 Describe the types of shoulder
  12.4.10 Define knurling
  12.4.11 Describe the purpose of knurling
  12.4.12 Describe the types of knurling according to shape and grade
  12.4.13 Define center drilling
  12.4.14 Define drilling
  12.4.15 Describe the method of drilling and center drilling on lathe machine
  12.4.16 Define taper and taper turning
  12.4.17 Describe the compound slide method of taper turning
12.5 List parts of tool grinder
  12.5.1 Describe each part
12.6 List parts of shaper
  12.6.1 Describe each part

MT-117 WORKSHOP PRACTICE-I

List of Practical:

A) Metal Work

1. **Preparation of name plate**
2. **Sawing exercise**
3. **Preparation of inside caliper**
4. **Preparation of Bottle opener**
5. **Preparation of dove-tail joint**
6. **Preparation of small size Try-square**
7. **Preparation of Coat hook**
8. **Preparation of funnel (sheet)**
9. **Preparation Pin tray (sheet)**
10. **Preparation of Drawer handle**
11. **Preparation of Bevel square**
12. **Preparation of spanner (small size)**

B) Wood Work

1. **Safety precautions in wood working shop**
2. **Identify and compare soft and hard wood**
3. **Assembly and disassembly of jack-plane**
4. **Use of various wood working planes. (Tool exercise)**
5. **Planning and squaring to dimensions. (Job-I)**
6. **Sharpening plane-iron blade.**
7. **Identify different wood working, layout and measuring tools.**
8. **Sawing exercise (Job-2)**
9. **Identify different types of handsaws, and making sketches of all saws**
10. **Sharpening 'band saws'**
11. **Wood chiseling (Chipping)**
12. **Making Mortise and Tenon joint (Job-3)**
13. **Sharpening wood chisel**
14. **Making dado-joint (Job-4)**
15. **Making cross-lap joint (Job-5)**
16. **Spirit polishing (preparing wood surface for polishing, staining and lacquering)**
17. **Making holes of different diameters in wood. (Job-6)**
18. **Nailing and wood screwing process (Job-7)**
19. **Making middle half cross-lap joint (Job-8)**
20. **Making dove-tail joint (Job-9)**
21. **Wood working projects.**

C) Welding and Forging

(OXY ACETYLENE)

1. **Flame making for gas welding**
   (a) Harsh Flame (b) Carburizing Flame (c) Neutral Flame (d) Oxidizing flame
2. **Pool making**
3. **Bead making**
4. **Edge joint**
5. **Open square butt joint (MS Flat 3mm thick)**

6. **Open square butt joint (MS Flat 5mm thick)**
7. **Half 'V' butt joint (Flat Position)**
8. **'V' Groove butt joint (Flat Position)**
9. **Corner joint**
10. **Open square brazing butt joint (MS Flat 3mm thick)**

(ARC WELDING)

11. **Types of Arc welding machines and their operation according to current adjustment**
12. **Arc making**
13. **Bead making**
14. **Open square Butt joint (MS Flat 5mm thick)**
15. **'V' Groove Butt joint**
16. **Lap joint**
17. **Corner Joint (Flat Position)**
18. **Corner joint (Vertical Position)**
19. **Spot welding practice (0.5 mm M.S Sheet)**
20. **Seam welding practice (0.5 mm M.S Sheet)**

(FORGING)

21. **Drawing down**

22. **Upsetting**

23. **Twisting**

24. **Punching**

D) Foundry Shop

1. **Introduction and layout of foundry shop**
2. **Introduction to foundry sand**
   - 2.1 Dry sand molding
   - 2.2 Binding materials
3. **Introduction to hand molding tools, equipments and molding boxes /flasks.**
4. **Introduction and practice of sand cleaning and mixing machines**
5. **Sand preparation and tempering practice**
6. **Practice of mould making**
   - 6.1 Dry sand molding
   - 6.2 Green sand molding
7. **Molding practice with use of single piece patterns (one piece patterns)**
   - 7.1 English letters (Alphabet)
   - 7.2 Paper weight
   - 7.3 Simple square, triangular and hexagonal patterns)
8. **Molding practice with use of split patterns (two piece patterns)**
   - 8.1 Anvil
   - 8.2 Journal bearing body
   - 8.3 Pulley

E) Basic Machine Shop

1. **Practice of cleaning and oiling the lathe machine**

2. **Practice of centering the job by tool method**
3. **Practice of centering the job held in a four jaw chuck or face plate**
4. **Practice of facing**
5. **Practice of straight turning**
6. **Practice of center drilling**
7. **Practice of drilling on lathe**
8. **Practice of step turning**
9. **Practice of knurling**
10. **Practice of boring a straight hole**
11. **Practice of step or counter boring**
12. **Practice of reaming**
13. **Practice of tool grinding**
14. **Practice of taper turning by compound rest method**
15. **Practice of cutting metric threads on lathe machine**

Recommended Textbooks:

1. **Technology of Machine Tools by Steve F. Krar, Albert F. Check**
2. **Machine Tools Technology by Willard J. McCarthy, Dr. Victor E. Repp**
3. **Machine Tools Metal working by Jhon L. Feirer**
4. **Shop Theory by James Anderson, Earl E. Tatro**

MT-117 **WORKSHOP PRACTICE-I**

List of Machinery:

A) Metal Work

1.	Bench Vices (200mm)	44-set
2.	Work Benches	11-set
3.	Pedestal Grinder	1-set
4.	Power Hacksaw	1-set
5.	Bending Machine	1-set
6.	Tool Grinder	1-set
7.	Drilling Machine	1-set
8.	Sheet Rolling Machine	1-set
9.	Hand Shear Machine	1-set

B) Wood Work

1.	Band Saw	1-set
2.	Circular Saw	1-set
3.	Disc Sander	1-set
4.	Mortising Machine	1-set
5.	Jig Saw	1-set
6.	Wood Turning Lathe	2-set
7.	Work Benches	11-set
8.	Wood Working Vices (200 mm)	44-set
9.	Pedestal Grinder	1-set
10.	Drilling Machine	

C) Welding and Forging

1.	Oxygen Cylinder	4-set
2.	Acetylene Cylinder	4-set
3.	Welding Torches	11-set
4.	Work Benches	11-set
5.	Welding Transformers	4-set
6.	Welding Rectifiers	2-set
7.	Spot Welder	2-set
8.	Seam Welding Machine	1-set
9.	Preheating Furnace (Gas Fired)	1-set
10.	Swage Block	1-set
11.	Anvil	4-set

D) Foundry Shop

1.	Cupola furnace	1-set
2.	Tilting furnace	2-set
3.	Hand grinding machine	1-set
4.	Pedestal grinding machine	1-set
5.	Sand blasting machine	1-set

6.	**Core baking oven**	**2-set**
7.	**CO_2 molding Apparatus**	**1-set**
8.	**Crucible pit furnace (Gas fired)**	**2-set**
9.	**Riddle (16 mesh)**	**2-set**
10.	**Riddle (18 mesh)**	**2-set**
11.	**Squeezing and jolting machine**	**1-set**
12.	**Molding box (Steel frame)**	**12-set**
13.	**Crucible**	**4-set**
14.	**Water Sprinkler**	**2-set**

E) Basic Machine Shop

1.	**Lathe Machine**	**22Nos.**
2.	**Shaper**	**2 Nos.**
3.	**Pedestal Grinder**	**2 Nos.**
4.	**Drilling Machine**	**2 Nos.**
5.	**Power Hacksaw**	**1No.**

COMP-142

COMPUTER APPLICATIONS

COMP-142 COMPUTER APPLICATIONS

Total Contact Hours	T	P	C
Theory: 32Hrs	1	3	2
Practical: 96 Hrs			

Pre-requisites: None

AIMS: This subject will enable the student to be familiar with the fundamental concepts of Computer Science. He will also learn MS-Windows, MS-Office, and Internet to elementary level.

Course Contents:

1. ELECTRONIC DATA PROCESSING (E.D.P.) 6 Hrs

1.1 Basic Terms of Computer Science Data & its types, Information, Hardware, Software
1.2 Computer & its types
1.3 Block diagram of a computer system
1.4 BIT, Byte, RAM & ROM
1.5 Input &Output devices
1.6 Secondary storage devices
1.7 Types of Software
1.8 Programming Languages
1.9 Applications of computer in different fields
1.10 Application in Engineering, Education & Business

2. MS-WINDOWS 2 Hrs

2.1 Introduction to Windows
2.2 Loading & Shut down process
2.3 Introduction to Desktop items (Creation of Icons, Shortcut, Folder & modify Taskbar)
2.4 Desktop properties
2.5 Use of Control Panel
2.6 Searching a document

3. MS-OFFICE (MS-WORD) 8 Hrs

3.1 Introduction to MS-Office
3.2 Introduction to MS-Word & its Screen
3.3 Create a new document
3.4 Editing & formatting the text
3.5 Saving & Opening a document
3.6 Page setup (Set the Margins & Paper)
3.7 Spell Check & Grammar
3.8 Paragraph Alignment
3.9 Inserting Page numbers, Symbols, Text box & Picture in the document, **Equation**
3.10 Use the different Format menu drop down commands(Drop Cap, Change Case, Bullet & Numbering and Border & Shading)
3.11 Insert the 'Table and its Editing
3.12 Printing the document
3.13 Saving a document file as PDF format

4. MS-OFFICE (MS-EXCEL) 9 Hrs

4.1 Introduction to MS-Excel & its Screen
4.2 Entering data & apply formulas in worksheet
4.3 Editing & Formatting the Cells, Row & Colum
4.4 Insert Graphs in sheet
4.5 Page setup, Print Preview & Printing

4.6 Types & Categories of Charts

5. MS. OFFICE (MS-POWER POINT) 4 Hrs

5.1 Introduction to MS-Power point
5.2 Creating a presentation
5.3 Editing & formatting a text box
5.4 Adding pictures & colors to a slide
5.5 Making slide shows
5.6 Slide Transition

6. INTERNET & E-MAIL 3Hrs

6.1 Introduction to Internet & browser window
6.2 Searching, Saving and Print a page from internet
6.3 Creating, Reading & Sending E-Mail
6.4 Explain some advance features over the internet and search engines

COMP-142 COMPUTER APPLICATIONS

Instructional Objectives:

1. UNDERSTAND ELECTRONIC DATA PROCESSING (E.D.P)

1.1. Describe Basic Terms of Computer Science Data & its Types, Information, Hardware, Software
1.2. Explain Computer & its types
1.3. Explain Block diagram of a computer system
1.4. State the terms such as BIT, Byte, RAM & ROM
1.5. Identify Input & Output devices
1.6. Describe Secondary Storage devices
1.7. Explain Types of Software
1.8. Introduction to Programming Language
1.9. Explain Applications of computer in different fields
1.10. Application in Engineering, Education & Business

2. UNDERSTAND MS-WINDOWS

2.1 Explain Introduction to Windows
2.2 Describe Loading & Shut down process
2.3 Explain Introduction to Desktop items(Creation of Icons, Shortcut, Folder & modify Taskbar)
2.4 Explain Desktop properties
2.5 Describe Use' of Control Panel (add/remove program, time & date, mouse and create user account)
2.6 Explain the method of searching a document

3. UNDERSTAND MS-OFFICE (MS-WORD)

3.1 Explain Introduction to MS-Office
3.2 Describe -Introduction to MS-Word & its Screen
3.3 Describe create a new document
3.4 Explain Editing & formatting the text
3.5 Describe saving & Opening a document
3.6 Explain Page setup, (Set the Margins & Paper)
3.7 Describe Spell Check & Grammar
3.8 Explain Paragraph Alignment
3.9 Explain Inserting Page numbers, Symbols, Text box & Picture in the document
3.10 Describe Use the different Format menu drop down commands(Drop Cap, Change Case, Bullet &Numbering and Border & Shading)
3.11 Explain Insert the Table and its Editing and modifying
3.12 Describe printing the document
3.13 Describe the method of file saving as a PDF Format

4. UNDERSTAND MS-OFFICE (MS-EXCEL)

4.1 Explain Introduction to MS-Excel & its Screen
4.2 Describe Entering data & apply formulas in worksheet
4.3 Describe Editing &Formatting the, Cells, Row & Column
4.4 Explain Insert Graphs in sheet
4.5 Describe Page setup, Print preview & Printing
4.6 Explain in details formulas for sum, subtract, multiply, divide, average
4.7 Explain in details the types of charts e.g. pie chart, bar chart

5. UNDERSTAND MS-OFFICE (MS-POWER POINT)

5.1 Describe Introduction to MS-Power point
5.2 Explain creating a presentation
5.3 Describe Editing & formatting a text box
5.4 Explain Adding pictures & colors to a slide

5.5 Describe Making slide shows
5.6 Explain Slide Transitions

6. UNDERSTAND INTERNET &E-MAIL

6.1 Explain Introduction to Internet and browser window
6.2 Explain Searching, Saving and Print a page from internet
6.3 Describe Creating, Reading & Sending E-Mail and attachments
6.4 Explain some advance features over the internet and how to search topics on different search engines

Recommended Textbooks:

1. **Bible Microsoft Office 2007 by John Walkenbach**
2. **Bible Microsoft Excel 2007 by John Walkenbach**
3. **Bible Microsoft PowerPoint 2007 by John Walkenbach**

COMP-142 COMPUTER APPLICATIONS

List of Practical:

1. Identify key board, mouse, CPU, disks, disk drives, monitor and printer 3Hrs

2. MS WINDOWS XP 12 Hrs

2.1 Practice of loading and shutdown of operating system
2.2 Creating items (icons, shortcut, folders etc) and modifying taskbar
2.3 Changing of wallpaper, screensaver, and resolution
2.4 Practice of control panel items (add/remove, time and date, mouse, and create user account)

3. MS OFFICE (MS-WORD) 27 Hrs

3.1 Identifying the MS Word Screen and its menu
3.2 Practice of create a new document, saving and re-opening it from the location and spell check & grammar
3.3 Practice of Page Formatting (Borders, Character Spacing, Paragraph, Bullets & Numberings and Fonts)
3.4 Practice of different tool bars like standard, format& drawing tool bars
3.5 Practice of Insert pictures, clipart, and shapes
3.6 Practice of header and footer
3.7 Practice of insert table and also format of table
3.8 Practice of page setup, set the page margins, and printing documents

4. MS OFFICE (MS-EXCEL) 27 Hrs

4.1 Identifying the MS EXCEL Screen and its menu
4.2 Practice of create a new sheet, saving and re-opening it from the location and spell check
4.3 Practice of insert and delete of row and columns (format of cell)
4.4 Practice of entering data and formulas in worksheet(Add, Subtract, Multiplying, and Divide & Average)
4.5 Repeating practical serial number04
4.6 Practice of insert chart and its types
4.7 Practice of page setup, set the page margins, and printing

5. MS OFFICE (MS-POWER POINT) 15 Hrs

5.1 Identifying the MS POWER POINT Screen and its menu
5.2 Practice of create a new presentation and save
5.3 Practice of open saves presentations
5.4 Practice of inset picture and videos

6. INTERNET & E-MAIL 12 Hrs

6.1 Identifying internet explorer
6.2 Practice of searching data from any search engine
6.3 Practice of create an E-Mail account and how to send and receive mails, download attachments

COMP-142 COMPUTER APPLICATIONS

Practical Objectives:

1. Identify key board, mouse, CPU, disks, disk drives, monitor, and printer

1.1. Understand use and features of keyboard, CPU, disk drives, disks, monitor, and printer

2. MS WINDOWS XP

2.1 Practice of loading and shutdown of operating system
- 2.1.1 Students will be able to load and shutdown of operating system

2.2 Creating items (icons, shortcut, folders etc) and modifying taskbar
- 2.2.1 Student will be able to create, modify & delete icons, shortcuts, & folders

2.3 Changing of wallpaper, screensaver, and resolution
- 2.3.1 Student will be able to change wallpapers, screensavers, & resolution size

2.4 Practice of control panel items (add/remove, time and date, mouse, and create user account)
- 2.4.1 Student will be able to adjust control panel items (add/remove, time & date, Mouse, and configure the user account)

3. MS OFFICE (MS-WORD)

3.1 Identifying the MS Word Screen and its menu
- 3.1.1 Student will be able to identify the MS Word screen and its menus

3.2 Practice of create a new document, saving and re-opening it from the location and spell check & grammar
- 3.2.1 Student will be able to create new documents, save documents and reopen the saved documents and spell check and grammar

3.3 Practice of Page Formatting (Borders, Character Spacing, Paragraph, Bullets & Numberings and Fonts)
- 3.3.1 Student will be able to change the format of documents (Borders, Character Spacing, Paragraph, Bullets & Numberings and Fonts)

3.4 Practice of different tool bars like standard, format & drawing tool bars
- 3.4.1 Student will be able to use the standard, format and drawing tools

3.5 Practice of Insert pictures, clipart, and shapes
- 3.5.1 Student will be able to add pictures, clipart and different shapes into document

3.6 Practice of header and footer
- 3.6.1 Student will be able to make and adjust header & footer

3.7 Practice of insert table and also format of table
- 3.7.1 Student will be able to insert and format the table

3.8 Practice of page setup, set the page margins, and printing documents
- 3.8.1 Student will be able to adjust page setup, margin and print documents

4. MS OFFICE (MS-EXCEL)

4.1 Identifying the MS EXCEL Screen and its menu
- 4.1.1 Student will be able to identify the MS EXCEL screen and its menus

4.2 Practice of create a new sheet, saving and re-opening it from the location and spell check
- 4.2.1 Student will be able to create new documents, save documents and reopen the saved documents and spell check and grammar

4.3 Practice of insert and delete of row and columns (format of cell)
- 4.3.1 Student will be able to insert and delete row and columns

4.4 Practice of entering data and formulas in worksheet(Add, Subtract, Multiplying, and Divide & Average)

4.4.1 Student will be able to use different formulas in worksheet(Add, Subtract, Multiplying, and Divide & Average)

4.5 Repeating practical serial number 04

4.6 Practice of insert chart and its types

4.6.1 Student will be able to insert different types of chart into worksheet

4.7 Practice of page setup, set the page margins, and printing

4.7.1 Student will be able to adjust page setup, margin and print worksheets

5. MS OFFICE (MS-POWER POINT)

5.1 Identifying the MS POWER POINT Screen and its menu

5.1.1 Student will be able to identify the MS POWER POINT screen and its menus

5.2 Practice of create a new presentation and save

5.2.1 Student will be able to create a presentation and save it

5.3 Practice of open saves presentations

5.3.1 Student will be able to open the saves presentations

5.4 Practice of inset picture and videos

5.4.1 Students will be able to insert picture and video clips

6. INTERNET & E-MAIL

6.1 Identifying internet explorer

6.1.1 Students will be able to identify the Internet explorer screen

6.2 Practice of searching data from any search engine

6.2.1 Students will be able to search information catalog, e-books etc from different search engine

6.3 Practice of create an E-Mail account and how to send and receive mails, download attachments

6.3.1 Students will be able to create E-mail account, send and receive mails and download attachments

MT-142 **COMPUTER APPLICATIONS**

List of Equipment, Software and furniture:

7	**Computer**	**50-set**
7	**Computer Table**	**50-set**
7	**Computer Chair**	**50-set**
7	**Multimedia Projector**	**1-set**
7	**Microsoft Office 2007 (Software)**	**50-No.**
7	**Microsoft Windows 7**	**50-set**
7	**Printer**	**01-No.**
7	**Scanner**	**01-No.**

MT-141

HEALTH SAFTY AND ENVIRONMENT

MT-141 **HEALTH SAFETY AND ENVIRONMENT**

Total Contact Hours	**T**	**P**	**C**
Theory: 32Hrs	**1**	**0**	**1**

Pre-requisites: None

AIMS: At the end of this course, the students will be able to:-

1. Adopt safety standards, codes, rules, etc., to be desired in Mechanical Workshop / Labs of Industries.
2. Understand methods of prevention of accident.
3. Provide first aid and rescue in case of any accident.

Course Contents:

1.	**Introduction and Importance of Safety**	**1 Hr**
2.	**Accident in Chemical Industry**	**2 Hrs**
3.	**Accidents in Mechanical Industry**	**3 Hrs**
4.	**Accidents in Process Industry**	**2 Hrs**
5.	**Accidents in other Industries**	**2 Hrs**
6.	**Electric shocks (Prevention and its remedies)**	**2 Hrs**
7.	**Fire Accidents and their preventions**	**3 Hrs**
8.	**Safety in Plant layout**	**2 Hrs**
9.	**Personal Protective Equipments (PPE)**	**2 Hrs**
10.	**Environmental Safety**	**3 Hrs**
11.	**Pollution**	**2 Hrs**
12	**First Aid**	**2 Hrs**
13.	**Analyzing Causes of Accidents**	**3 Hrs**
14.	**Promoting Safety Culture**	**1 Hr**
15.	**Safety Regulations & adherence to International Safety Standards**	**2 Hrs**

Detail of Contents:

1. Introduction and Importance of Safety **1Hr**

- 1.1 Introduction to safety and House keeping
- 1.2 Importance in Institute workshops /labs
- 1.3 Importance in industry
- 1.4 Accident cost

2. Accidents in Chemical Industry **2 Hrs**

- 2.1 Accidents in petroleum, paint and fertilizer industry
- 2.2 Explosive vapors and gases

3. Accidents in Mechanical Industry **3 Hrs**

- 3.1 Due to material handling and transportation
- 3.2 Accidents due to hand tools
- 3.3 Accidents in machines shop
- 3.4 Accidents in Metal workshop
- 3.5 Accidents in wood working shop
- 3.6 Accidents in foundry, welding and forging shop
- 3.7 Safety in CNC machines operation

4. Accidents in Flow Production Industry **2 Hrs**

4.1 Accidents in textile mills, paper mills & food Industries

5. Accidents in other Industries **2Hrs**

5.1 Accidents in mines
5.2 Accidents in leather industries
5.3 Accidents in power plant

6. Electric shocks & Earthing (Prevention and its remedy) **2Hrs**

6.1 Electricity as danger
6.2 Electric shock phenomena
6.3 Reasons of electric shock
6.4 Prevention of electric shock
6.5 First aid in electric shock

7. Fire accidents and their prevention **3 Hrs**

7.1 Fire accidents and their prevention
7.2 Fire hazard and their types
7.2.1 Causes of fire hazard
7.3 Fire fighting equipments, and fire extinguishers
7.4 Plant lay out for fire safety

8. Safety in plant Lay-out **2 Hrs**

8.1 Safety in Plant lay out
8.2 Housekeeping for safety
8.3 Safety instruction during maintenance
8.4 Safety instruction in use of electricity

9. Personal Protective Equipment (PPE) **2 Hrs**

9.1 Useful protective device
9.2 Personal protective device and its importance
9.3 Protection from chemicals and gases

10. Environmental Safety **3 Hrs**

10.1 Environmental Safety
10.2 Industrial ventilation
10.3 Exhaust systems
10.4 Industrial noise
10.5 Illumination for safety and comfort
10.6 Industrial hygiene and plant sanitation
10.7 Thermal radiation
10.8 Waste Disposal, Dust and fumes, Over Crowding
10.9 The Artificial humidification
10.10 Drinking water

11. Pollution **2 Hrs**

11.1 Atmosphere
11.2 Water pollution
11.3 Solid waste management

12. First Aid **2 Hours**

12.1 Importance
12.2 Procedure and training
12.3 Extended medical services

13. Analyzing Causes of Accidents **3 Hrs**

13.1 Accident prevention fundamentals
13.2 Plant inspections and accidents investigation
13.3 Safety inventory, auditing, records and annual reports

14. Promoting Safety Culture **2 Hrs**

14.1 Employees training culture
14.2 Displays
14.3 Guidance

15. Safety Regulations & adherence to International Safety Standards **2Hrs**

15.1 Safety Regulations & adherence to International Safety Standards
15.2 Pakistan Factory Act (laws concerning to safety)
15.3 Workman compensation act
15.4 Industrial insurance and social security
15.5 Legal aspects of safety

MT-141 HEALTH SAFETY AND ENVIRONMENT

Instructional Objectives:

1. Know importance of safety practices and its necessity in the industry

1.1 Describe importance of housekeeping, Safety and accidents
1.2 Describe the importance of safety practices in Institute shops/labs
1.3 Describe the hazards for not observing safety
1.4 State necessity/importance of observing safety in the industry at the Cost of accident

2. Know causes and preventions of accident in chemical based industry

2.1 State the type and causes of accidents in petroleum, fertilizer, plaint and chemical based industry
    2.1.1 Enlist causes and preventions of chemical based industrial accidents
2.2 Describe accidental causes and effects of explosive gases and vapors
    2.2.1 Describe toxic chemicals and their effects on human
    2.2.2 List of preventions for accidental causes due to explosive gases and vapors

3. Know causes and prevention of accidents in mechanical industry

3.1 List of accidents in material handling and transportation in industry
    3.1.1 Describe the methods of prevention of accident due to material and machine handling in manufacturing Industry
3.2 Explain proper use of hand tools to prevent accident
3.3 Describe accidents in machines shop
3.4 Describe accidents in Metal workshop
3.5 Describe accidents in wood working shop
3.6 Describe accidents in foundry, welding and forging shop
3.7 Describe Safety in CNC machines operation

4. Know causes and methods of prevention of accident in flow process industry

4.1 State the types of accident in flow process industry
    4.1.1 List the accident in textile mills, paper and board mills and food industry
    4.1.2 Describe the methods of prevention of accidents in above listed industries

5. Describe accidents and their remedy

5.1 Describe accidents in Mines
5.2 Describe accidents in Leather industries
5.3 Describe accidents in Power plant (Steam)

6. Electric shocks & Earthling (Prevention and its remedy)

6.1 Describe Electricity as danger
6.2 Describe Electric shock phenomena
6.3 Describe Reasons of electric shock
6.4 Describe Prevention of electric shock
6.5 Describe First aid in electric shock

7. Fire Accidents and their prevention

7.1 Describe prevention of fire accidents on plant
7.2 Know the causes of fire hazard
    7.2.1 Identify fire hazard and their types
    7.2.2 List the causes of accidents due to fire
7.3 Know Steps to control fire/fire fighting
    7.3.1 Training of fire fighting with the help of Rescue 1122
    7.3.2 Know the types of fire extinguishers and their use
7.4 Identify the fire safety points in plant layout

8. Know the basic concept of safety in plant layout

8.1 Identify the safety aspect in plant layout
8.2 Describe the house keeping procedure for safety
8.3 Identify the procedure to lay out machines and equipments by considering safety aspect
8.4 Explain the instructions use of electricity

9. Know principle method and importance of personal protective device

9.1 State useful protective devices
9.2 List personal protective devices and describe their importance
- 9.2.1 Describe protection devices protecting Hand, faces, Ear, Leg, Foot and Eyes
- 9.2.2 Describe protection
- 9.2.3 Describe personal safety equipments
- 9.2.4 Describe lather safety belt, fire ropes, chain, slings and other supports for precautions

9.3 Describe use of protection devices for protecting from chemicals and gases

10. Understands the environmental effect of accident and their remedies

10.1 Knows environmental effects on human beings and surroundings
10.2 Explain importance and purpose of industrial ventilation
10.3 Describe exhaust system in industry and their important
10.4 Identify effect of noise on environment and its role in accidents
- 10.4.1 Causes of audible (Noise) their control vibrations and vibration dampers and necessity of hearing protectors

10.5 Identify the advantages of illumination for safety and comfort
10.6 Explain necessity of plant hygiene for safety and comfort
10.7 Explain causes of thermal radiation and its remedy
10.8 Explain causes and remedy of spitting dust, fumes, improper light and overcrowding accidents
10.9 Explain needs of artificial humidification
10.10 Explain effects of polluted water

11. Pollution

11.1 Describe different stages of Atmosphere i.e. stratosphere, mesosphere, ionosphere etc.
11.2 Describe the international standards of pure water
- 11.2.1 State how water get polluted
- 11.2.2 Describe methods of purification of polluted water at different Level

11.3 Describe the solid waste types and its management
- 11.3.1 State different methods of solid waste collection
- 11.3.2 Describe recycling and disposal of solid waste

12. Know the methods of providing first aid

12.1 Identify the importance of first aid
12.2 Explain the methods of providing fist aid and their training may be arranged to train the students in first aid procedure (a video)
12.3 Identify the step by step procedure of providing medical services
- 12.3.1 Describe protection of respiration system and methods of artificial respiration

13. Analyzing the causes of accidents

13.1 Understand the procedure of analyzing the causes of accidents
- 13.1.1 Identify the general causes of accident
- 13.1.2 Explain step by step procedure to analyze the accidents

13.2 Know the use of data for investigation and resident reports for analyzing the causes of accident
- 13.2.1 Record safety inventory, accident report and investigation reports, annual reports
- 13.2.2 Collect the data of accident for analyzing the root of accidents

13.3 Identify safety rules procedures in the light of annual accidents report for safe guard

14. Understand the methods and procedures for promoting safety culture

14.1 Identify the importance of safety

14.2 Describe methods of promoting safety concept by display charts, play cards, Banners and wall chalking; through guidance

14.3 List methods of promoting safety concepts

15. Understand Safety Regulations & adherence to International Safety Standards

15.1 Explain safety Regulations & adherence to International Safety Standards

15.2 Describe clauses of Pakistan Factory Act related to safety

15.3 Describe Workman compensation Act

15.4 Identify the procedure for industrial insurance and social security

15.5 Describe legal procedure in case of serious accidents

Recommended Books:-

1. ENVIRONMENTAL SAFETY AND HEALTH ENGINEERING
   BY GAYLE WOODSLDE, DIANNA K O CUREK
2. SAFETY ENGINEERING PRINCIPLES AND PRACTICES
   BY FRANK R. SPELLMAN
3. SAFETY ENGINEERING
   BY JAMES COVAN

MT-163

BASIC ENGINEERING DRAWING &CAD-I

MT-163 BASIC ENGINEERING DRAWING & CAD-I

Total Contact Hours		T	P	C
Theory:	32Hrs	1	6	3
Practical:	192Hrs			

Pre-requisites: None

AIMS: At the end of this course the students will be able to understand the Fundamentals of Engineering Drawing used in the various fields of industry especially in the Mechanical Technology. The students will be **familiarized** with the use of conventional drawing equipments as well as the modern techniques used for this subject. Also he will be familiarize with AutoCAD and will achieve ability to draw simple geometrical figures.

Detail Course Contents:

PART-A Manual Drawing 70%

1. Application of Technical Drawing **2Hrs**

1.1 Importance of Technical Drawing
1.2 Language of engineering terminology
1.3 Uses of Technical Drawing
1.4 Type of Drawing
1.5 Application of Technical drawing

2. Drafting Equipments, Construction Uses, and Care **1Hr**

2.1. Introduction and importance of drafting equipments
2.2. List of drawing equipments
2.3. Construction, uses and care of all equipment
2.4. Drafting board, Table and machine
2.5. Tee, Triangles and protractors
2.6. Instruments Box and its accessories
2.7. Drawing Pencil, their grading, sharpening and using techniques
2.8. Scale and its types

3. Types of Lines **1Hr**

3.1. Basic lines
3.2. Importance of lines
3.3. Common Types of lines
3.4. Uses and correct line **weightage**

3.5. Use of pencil for different lines
3.6. Application of lines
3.7. Objectives in drafting

4. Lettering **2Hrs**

4.1. Importance of a good lettering
4.2. General Proportion of lettering
4.3. Composition of letters
4.4. **Guidelines**
4.5. Classification of lettering
4.6. Style of letters
4.7. Lettering devices

5. Drafting Geometry **2Hrs**

5.1. Introduction to geometry, plane and solid type
5.2. Definition of terms
5.3. Different conventional shapes, surfaces and objects
5.4. Basic geometrical construction

6. Sketching and shape description **1Hr**

6.1. Introduction to sketching techniques
6.2. Techniques of sketching straight lines in different directions
6.3. Sketching circles and arcs
6.4. Sketching Ellipse
6.5. Sketching of pictorial views
6.6. Proportions in sketching

7. Engineering Curves **1Hr**

7.1. Introduction to the curve
7.2. Application of engineering curves
7.3. Cone and conic section
7.4. Spiral and Involutes
7.5. Cycloid, Epicycloids, Hypocycloid

8. Introduction to multi-view drawings **4Hrs**

8.1. Introduction to the plane and its types
8.2. Dihedral and Trihedral angles
8.3. Projection of point, lines, plane and solids
8.4. Definition and concept of multi-view drawings
8.5. Perceptual views of plan of projections
8.6. Orthographic projections
8.7. 1^{st} angle and 3^{rd} angle projection
8.8. Principal views and its arrangements
8.9. Multi-view drawings and missing lines

9. Introduction to Pictorial drawing **4Hrs**

9.1. Uses of pictorial /3D
9.2. Three types of pictorial views
9.3. Isometric sketching of rectangular block with Arcs and circles
9.4. Oblique sketching of rectangular block
9.5. One point perspective sketching of rectangular block
9.6. Two points perspective sketching of rectangular block
9.7. Preparation of pictorial drawings of simple objects

10. Basic Dimensioning **2Hrs**

10.1. Definition of dimensioning
10.2. Types of dimensioning

10.3. Elements of dimensioning
10.4. System of measurements
10.5. Dimensioning of multi view drawing
10.6. Dimensioning pictorial views
10.7. Dimensioning rules and practices
10.8. Note & specification

11. Introduction to multi-view drawings **2Hrs**

11.1. Introduction to the surface development
11.2. Role of development in Packaging Industry
11.3. Methods to develop the surfaces
11.4. Geometrical solids and development

PART- B Auto CAD Mechanical 2010 30%

12. Introduction of Auto CAD Mechanical 2010 **2Hrs**

12.1. User Interface
12.2. Template
12.3. Layers and Object
12.4. Mechanical Structure

13. Drawing and Edit **3Hrs**

13.1. Object Snap
13.2. Drawing Command
13.3. Edit Command
13.4. Object Command

14. Layers **1Hr**

14.1. Layers

15. Dimension and Symbols **2Hrs**

15.1. Create Dimension
15.2. Edit Dimension
15.3. Create Symbols

16. Drawing Layout **2Hrs**

16.1. Make Layout
16.2. Create Drawing Frame
16.3. Create Contents and Template

Recommended Textbooks:

1. **Mechanical Drawing (12th Addition) by French. Svensen, Helsel and Urbanick**
2. **Drafting Fundamentals by scot. Foy, Schwendan**
3. **Engineering Drawing and Design 2nd addition by Cecil Jenson / Jay Helsel**
4. **Engineering Drawing by Colinsimmous, Dennis Maguire**
5. **Technical Drawing by Frederik E. Alva. Henry Cecil**
6. **Text Book of machine Drawing by R.K. Dhawan**
7. **Engineer Drawing by M.B. Shah (B.C.Rana)**
8. **Autodesk Official Training Courseware(AOTC) Volume1**

9. Autodesk Official Training Courseware(AOTC) Volume2

MT-163 BASIC ENGINEERING DRAWING & CAD-I

Instructional Objectives:

1. Know the application of Technical Drawing

1.1 Describe the technical drawing and its importance
1.2 Describe the role of Inventor, Engineer, Designer, Technician, Craftsman etc.
1.3 Describe the uses of drawing in manufacturing and construction fields
1.4 Describe the free hand and instrumental drawing
  1.4.1 Explain the types of instrumental drawing
  1.4.2 Describe Multi-view, Pictorial and Schematic drawing
1.5 Recognize the different application of technical drawing

2. Know and use the common Drafting equipment and accessories

2.1 Explain the introduction and importance of drafting equipments
2.2 Identify the different instruments used in drafting
2.3 Describe the construction, uses and care of all equipments
2.4 Describe the Drafting Board, Table and Drafting machine
2.5 Explain the Tee, Triangles and Protractor
2.6 Describe the Compasses Divider, Lengthening Bar, Attachments etc.
2.7 Describe the use of pencils, their Grading and sharpening techniques
2.8 Explain the scale and its different types

3. Understand the Types of lines, correct weight age and their application in technical drawings

2.9 Describe the point, line and types of straight lines
2.10 Describe the importance of lines
2.11 Describe the common types of lines
2.12 Identify the each line Characteristics
2.13 Describe Horizontal, Vertical and inclined lines with proper grade pencil
2.14 Describe each line with his correct weight
2.15 Describe the objectives in drafting, Accuracy, Speed, Legibility and Neatness

4. Applies the good lettering on a drawing

4.1. Know the importance of good lettering in Engineering drawing
4.2. Know the general proportion of lettering such as normal, condensed and extended lettering
4.3. Describe and Identify the composition of letters
  4.3.1. Perform the best spacing between letters and words
  4.3.2. State the size and stroke of a letter
4.4. Describe the Gide lines
4.5. Describe the Gothic, Roman and free hand lettering
  4.5.1. Print single stroke, Double stroke lettering, Light face, Bold face lettering, Upper case, Lowe case lettering
4.6. Print vertical and Inclined style of Gothic lettering
  4.6.1 State the proper pencil for lettering with holding techniques
  4.6.2 Describe the general rules for lettering
4.7. Describe and use of different lettering devices such as lettering guide and lettering instrument

5. Apply drawing skill with the aid of drawing instruments in geometrical construction

5.1 Define the concept of common terms used in Geometrical construction
5.2 Explain different geometrical shapes, surfaces of objects
5.3 Bisecting a line, angles
5.4 Describe basic geometrical constructions
  5.4.1 Define Triangles, Quadrilateral, Polygons

5.4.2 Name and draw the parts of circle

6. Understand sketching of circles, arcs and view of objects

6.1 Describe sketching material
6.2 State Sketching Technique of Horizontal, Vertical and inclined lines
6.3 Describe circular arc using circular line method
6.3.1 A circular arc using square method
6.4 Draw an ellipse using rectangular method
6.5 Described the sketching of pictorial views
6.6 Proportions in sketching of views
6.6.1. Enlargement and Reduction

7 Know and draw the different Engineering Curves used in various mechanism

7.1 Describe the different engineering curves
7.2 Describe the application of different Engineering curves
7.3 Define cone and conic sections
7.3.1 Describe the Ellipse, Parabola & Hyperbola by different methods
7.4 Define the Archimedean Spiral and involutes
7.4.1 Define the Involutes curves of square, Triangle, Circle and Hexagon
7.5 Describe the Cycloid curves
7.5.1 Define Cycloid, Epicycloids and Hypocycloid curves

8 Understand the multi-view projections of specific object

8.5 Describe the plane and its types
8.6 Define Dihedral and Trihedral angles
8.7 Explain the projection of point, lines, plane and solids in different shapes
8.8 Define the concept of multi-view drawings
8.9 Knows Plane of projections
8.10 Know the orthographic method of projection
8.11 Explain the 1^{st} and 3^{rd} angle projections
8.12 State six principal views
8.13 Practice of multi-view projections and missing lines

9 Apply the use, types and methods of pictorial views

9.5 Describe the importance of pictorial views
9.6 State three types of pictorial drawings
9.7 Describe isometric view of rectangular blocks, arcs, circles
9.8 Describe oblique sketching of a rectangular blocks
9.9 Describe one point perceptive view of rectangular block
9.10 Describe two point perspective view of a rectangular block
9.11 Prepare/draw pictorial drawings of simple objects

10 Apply good dimensioning on multi-view and pictorial drawings

10.5 Define dimensioning
10.6 Identify the types of dimensioning
10.7 Enlist the elements of dimensioning
10.8 Identify the system of measurements
10.9 Indicate complete dimension on multi-view drawings
10.10 Indicate complete dimension on pictorial drawings
10.11 Follow the general rules of dimensioning
10.12 Indicate notes and specification or multi-view drawings

11 Know the surface development and their procedure to develop and its role in packing industry

11.5 Define the surface development

11.6 Explain the role of development in Packaging Industry
11.7 Describe the methods to draw the development
    11.7.1 Parallel line or Rectangle method
    11.7.2 Radial line or Triangle method
    11.7.3 Triangulation method
11.8 Define and draw the different Geometrical solids and their development

12 Introduction of Auto CAD Mechanical 2010

12.5 User Interface
12.6 Understand Template
12.7 Understand Layers and Object
12.8 Understand Mechanical Structure

13 Drawing and Edit

13.5 Understand the Object Snap
13.6 State the Drawing Command
13.7 Understand the Edit Command
13.8 Describe the Object Command

14 Layers

14.1. Describe the creation and modifying Layers

15 Dimension and Symbols

15.5 Understand create Dimension
15.6 Understand create editing Dimension
15.7 Understand create Symbols

16 Drawing Layout

16.5 Understand creation of Layout
16.6 Understand creation of Drawing Frame
16.7 Understand creation of Contents and Template

MT-163 BASIC ENGINEERING DRAWING & CAD-I

List of Practical:

PART-A

1. Practice of single stroke capital vertical lettering on graph and drawing sheet
2. Practice of single stroke capital inclined lettering on graph and drawing sheet
3. Practice of single stroke capital vertical & inclined lettering
4. Double stroke lettering
5. Use of Tee-square and set squares for drawing horizontal, vertical and inclined lines
6. Use of compass, circles, half circles, radius
7. Use of Tee-square and compass for drawing of lines, centers, curves, and crossing of lines
8. Draw round corners, figure inside and outside circle
9. Construction of angles and triangles
10. Construction of quadrilaterals and circles elements
11. Construction of parallel-lines, perpendicular, bisects line, angles and equal division of lines
12. Construction of inscribe and circumscribe figures (square, triangle and hexagon)
13. Construction of pentagon by different methods
14. Construction of Hexagon, Octagon, by general and different methods
15. Construction of Tangents of circles (Inside & Outside)
16. Construction of Ellipse by four different methods
17. Construction of parabola curve by four different methods
18. Construction of hyperbola curve
19. Construction of Archimedean Spiral curve
20. Construction of involutes curve of square rectangle hexagon and circle
21. Construction of cycloid, epicycloids, and hypocycloid
22. Different types of drawing lines
23. Orthographic projection 1 and 3rd angle wooden block-1
24. Orthographic projection 1 and 3rd angle wooden block-2
25. Orthographic projection 1 and 3rd angle wooden block-3
26. Orthographic projection 1 and 3rd angle wooden block-4
27. Orthographic projection 1 and 3rd angle wooden block-5.
28. Orthographic projection and Isometric Drawing-I
29. Orthographic projection and Isometric Drawing-II
30. Orthographic projection and Oblique Drawing-I
31. Orthographic projection and Oblique Drawing-II
32. Construction of perspective drawings. (One point)
33. Construction of perspective drawings. (Two point)
34. Construction of multi view drawing of Gland
35. Construction of multi view drawing of Simple Bearing
36. Construction of multi view drawing of Open Bearing
37. Missing lines and portions on given views-I
38. Missing lines and portions on given views-II
39. Development of prism-I
40. Development of prism-II
41. Development of cylinder
42. Development of cone

43. **Development of pyramid-I**
44. **Development of pyramid-II**

PART-B

1. **Starting AutoCAD Mechanical 2010**
2. **Title Bar, Tool Bar, Menu Bar, Browser, Status Bar, Command Line**
3. **Zoom, Pan, Orbit**
4. **Object Snap, Grid, Orthogonal**
5. **Layer and Object Property**
6. **Construction Line and Center Line**
7. **Save AutoCAD Mechanical 2010**
8. **Line and Poly line Command**
9. **Circle, Arc and Ellipse Command**
10. **Rectangular and Polygon Command**
11. **Dimension and Hatching**
12. **Text Command**
13. **Copy, Mirror Command**
14. **Offset Command**
15. **Move, Rotate and Scale Command**
16. **Trim and Extend Command**
17. **Join and Break Command**
18. **Fillet and Chamfer Command**
19. **Explode Command**
20. **Exercise of Basic Drawings**
21. **Exercise of Mechanical Drawings.**

MT-163 BASIC ENGINEERING DRAWING & CAD-I

Practical Objectives: PART-A

1. Practice of single stroke capital vertical lettering on graph and drawing sheet

Upon completion of this activity the learner will be able to

1.1 Draw the border line and title strip
1.2 Construct the letters and numerals in correct shape and size using graph paper and drawing sheet
1.3 Develop skill to letter in proper sequence of strokes
1.4 Construct the letters and numerals in single stroke
1.5 Draw guidelines and maintain spacing between letters and numerals

2. Practice of single stroke capital inclined lettering on graph and drawing sheet

2.1 Develop the skill for border line and title strip
2.2 Construct the letters and numerals in single stroke inclined at an angle of 67 ½ degree
2.3 Draw guideline (horizontal and inclined) to maintain space between letters and numerals

3. Practice of single stroke capital vertical & inclined lettering

3.1 Draw the border line and title strip
3.2 Draw the parallel lines, vertical & inclined guide lines
3.3 Construct the vertical and inclined letters and numerals and correct shape and size using graph sheets and drawing sheets
3.4 Develop skills to letters in proper sequence of stroke

4. Double stroke lettering

4.1 Draw the border line and title strip
4.2 Draw the horizontal and vertical parallel lines
4.3 Use smoothly Tee, set square and compass
4.4 Draw the curves, semi circles and inclined lines
4.5 Develop skills to double skill letters in proper shape and size
4.6 Maintain the uniform thickness of letters and numerals

5. Use of Tee-square and set squares for drawing horizontal, vertical and inclined lines

5.1 Draw the Horizontal and vertical lines
5.2 Draw the inclined lines at any angle
5.3 Develop the skill to construct the figures having Horizontal, vertical and inclined lines

6. Use of compass, circles, half circles, radius

6.1 Draw the circles
6.2 Draw the curves
6.3 Develop the skill to construct the figures having circles, curves and different radii

7. Use of Tee-square and compass for drawing of lines, centers, curves, and crossing of lines

7.1 Develop the skill for border line and title strip
7.2 Draw the horizontal, vertical and inclined lines
7.3 Develop the skill to construct the figures having circles, curves and different radii

8. Draw round corners, figure inside and outside circle

8.1 Develop the skill for border line and title strip
8.2 Draw the horizontal, vertical and inclined lines
8.3 Develop the skill to construct the figures having circles, curves and different radii

9. Construction of angles and triangles

9.1 Draw the different angles
9.2 Draw the different triangles

9.3 Develop the skill to use of drawing instruments

10. Construction of quadrilaterals and circles elements

10.1 Draw different types of quadrilaterals and circle elements
10.2 Develop the skill to use of drawing instruments

11. Construction of parallel-lines, perpendicular, bisects line, angles and equal division of line

11.1 Draw the lines parallel lines , arcs and triangles
11.2 Bisect the lines, angles and arcs
11.3 Develop the skill to use of drawing instruments

12. Construction of inscribe and circumscribe figures (square, triangle and hexagon)

12.1 Draw the inscribed square, triangle and hexagon
12.2 Draw the circumscribed square, triangle and hexagon
12.3 Develop the skill to use of drawing instruments

13. Construction of pentagon by different methods

13.1 Draw the pentagon by different methods
13.2 Develop the skill to use of drawing instruments
13.3 Develop the skill to divide the line in two and five equal parts

14. Construction of Hexagon, Octagon, by general and different methods

14.1 Draw the Hexagon by different methods
14.2 Draw the Octagon by different methods
14.3 Draw the polygon by general method 1
14.4 Draw the Pentagon, Hexagon, Heptagon, Octagon etc by the general method 2
14.5 Develop the skill to use of drawing instruments

15. Construction of Tangents of circles (Inside & Outside)

15.1 Draw the tangent of the circles internally and externally
15.2 Develop the skill to use of drawing instruments

16. Construction of Ellipse by four different methods

16.1 Develop the skill for border line and title strip
16.2 Construct the “Ellipse” by different methods

17. Construction of parabola curve by four different methods

17.1 Develop the skill for border line and title strip
17.2 Construct the “Parabola” by different methods

18. Construction of hyperbola curve

18.1 Draw the Hyperbola
18.2 Develop the skill to construct the curve

19. Construction of Archimedean Spiral curve

19.1 Construct the spiral
19.2 Develop the skill to construct the Archimedean Spiral curve

20. Construction of involutes curve of square rectangle hexagon and circle

20.1 Develop the skill to construct the geometrical figures and curves
20.2 Draw the involutes of circles, square, triangle and Hexagon

21. Construction of cycloid, epicycloids, and hypocycloid

21.1 Understand and draw the cycloid curves
21.2 Understand and draw the Epicycloids curves
21.3 Understand and draw the Hypocycloid curves

22. Different types of drawing lines

21.1 Draw the alphabet of lines

21.2 Identify the various lines used in engineering drawing
21.3 Draw the different grades, weight and shape of lines in mechanical engineering drawing

23. Orthographic projection 1 and 3rd angle wooden block-1
23.1 Placement of views properly
23.2 Draw the orthographic views of simple block in first angle and third angle projection
23.3 Dimension the views

24. Orthographic projection 1 and 3rd angle wooden block-2
24.1 Draw the orthographic views of step block in first angle and third angle projections
24.2 Dimension and placement of views properly

25. Orthographic projection 1 and 3rd angle wooden block-3
25.1 Draw the orthographic views of given block in first angle and third angle projections
25.2 Understand the theory of first angle and third angle of projection
25.3 Understand the measurement on pictorial views

26. Orthographic projection 1 and 3rd angle wooden block-4
26.1 Draw the orthographic views of given block in first angle and third angle projections
26.2 Understand the dimension of views in first angle and third angle projection

27. Orthographic projection 1 and 3rd angle wooden block-5
27.1 Draw the orthographic views of given block in first angle and third angle projections
27.2 Understand the measurement on pictorial views

28. Orthographic projection and Isometric Drawing-I
28.1 Visualize multi-views and constructions of isometric drawing
28.2 Understand the steps for constructing isometric drawing
28.3 Constructing isometric drawing of simple objects

29. Orthographic projection and Isometric Drawing-II
29.1 Visualize views and select suitable direction for construction of isometric drawings
29.2 Construct isometric drawing using learned steps in previous activity
29.3 Identify the steps for isometric circles using four centre methods
29.4 Construct isometric circle in isometric drawings

30. Orthographic projection and Oblique Drawing-I
30.1 Visualize multi-views for constructions of oblique drawing
30.2 Understand the steps for constructing oblique drawing
30.3 Construct oblique drawing of simple objects

31. Orthographic projection and Oblique Drawing-II
31.1 Select view for drawing in true shape
31.2 Chose suitable angle for receding lines construct oblique drawing of objects having circular or irregular shapes

32. Construction of perspective drawings. (One point)
32.1 Understand and draw one point perspective of a simple object
32.2 Understand the Horizon, vanishing point, station point and picture plane
32.3 Understand and draw the projection lines for parallel perspective

33. Construction of perspective drawings. (Two point)
33.1 Understand and draw two point perspective of a simple object
33.2 Understand the Horizon, vanishing point, station point and picture plane
33.3 Understand and draw the projection lines for angular perspective

34. Construction of multi view drawing of Gland
34.1 Draw the three views of the gland

34.2 Understand the views detail
34.3 Show the interior detail of the object with hidden lines

35. Construction of multi view drawing of Simple Bearing
35.1 Draw the three view of simple bearing
35.2 Understand the interior constructions of simple bearing

36. Construction of multi view drawing of Open Bearing
36.1 Draw the three view of open bearing
36.2 Understand the interior constructions of open bearing

37. Missing lines and portions on given views-I
37.1 Understand the given views
37.2 Complete the missing views with the help of missing lines and views

38. Missing lines and portions on given views-II
38.1 Understand the given views
38.2 Complete the missing views with the help of missing lines and views

39. Development of prism-I
39.1 Identify prism and its terminology
39.2 Draw development of prism (Square Hexagon)

40. Development of prism-II
40.1 Identify prism and its terminology
40.2 Apply the procedure of parallel line development
40.3 Develop any right prism

41. Development of cylinder
41.1 Identify cylinder and its terminology
41.2 Develop the surface of cylinder

42. Development of cone
42.1 Identify the terminology of right cone
42.2 Develop the lateral surface of the cone

43. Development of pyramid-I
43.1 Identify the terminology of pyramid
43.2 Construct true length diagram
43.3 Develop the layout of right pyramid

44. Development of pyramid-II
44.1 Identify the terminology of pyramid
44.2 Construct true length diagram
44.3 Develop the layout of right pyramid

PART-B Auto-CAD-I

1. Starting AutoCAD Mechanical 2010
1.1 Understand starting AutoCAD Mechanical 2010

2. Title Bar, Tool Bar, Menu Bar, Browser, Status Bar, Command Line
2.1 Understand Title Bar, Tool Bar, Menu Bar, Browser, Status Bar, and Command Line

3. Zoom, Pan, Orbit
3.1 Understand Zoom, Pan, and Orbit

4. Object Snap, Grid, Orthogonal
4.1 Understand Object Snap, Grid, Orthogonal

5. Layer and Object Property
5.1 Understand Layer and Object Property

6. Construction Line and Center Line

6.1 Understand Construction Line and Center Line

7. Save AutoCAD Mechanical 2010

7.1 Understand Save AutoCAD Mechanical 2010

8. Line and Poly line Command

8.1 Perform Line and Poly line Command

9. Circle, Arc and Ellipse Command

9.1 Perform Circle, Arc and Ellipse Command

10. Rectangular and Polygon Command

10.1 Perform Rectangular and Polygon Command

11. Dimension and Hatching

11.1 Perform Dimension and Hatching

12. Text Command

12.1 Perform Text Command

13. Copy, Mirror Command

13.1 Perform Copy, Mirror Command

14. Offset Command

14.1 Perform Offset Command

15. Move, Rotate and Scale Command

15.1 Perform Move, Rotate and Scale Command

16. Trim and Extend Command

16.1 Perform Trim and Extend Command

17. Join and Break Command

17.1 Perform Join and Break Command

18. Fillet and Chamfer Command

18.1 Perform Fillet and Chamfer Command

19. Explode Command

19.1 Perform Explode Command

20. Exercise of Basic Drawings

20.1 Perform several exercises of Basic Drawings

21. Exercise of Mechanical Drawings

21.1 Perform several exercises of Mechanical Drawings

MT-163 **BASIC ENGINEERING DRAWING & CAD-I**

List of Machinery:

1.	**Computer**	**50-No.**
2.	**Computer Table**	**50-No.**
3.	**Computer Chair**	**50-No.**
4.	**Multimedia Projector**	**1-set**
5.	**AutoCAD 2010 (Software)**	**50-No.**
6.	**Microsoft Windows 7**	**50-No.**
7.	**Drawing Tables**	**50-sets**
8.	**Drawing Stools**	**50-sets**