

**UNIVERSITY OF SARGODHA, SARGODHA**  
**NOTIFICATION**



No. UOS/Acad/623

Dated: 24/12/18  
6:30:09, 2018

On the recommendations of Academic Council made in its meeting dated 27.12.2017, the Syndicate in its 3/2017 meeting held on 30.12.2017 has endorsed the following recommendations of the Board of Faculty of Engineering and Technology after the provision of vetted copies of the course codes and credit hours by the Director Academics:

1. Revision in scheme of studies and course curriculum for B.Sc Civil Engineering, fall 2018.
2. Revision of scheme of studies and course curriculum for B.Sc Electrical Engineering, fall, 2013, 2014 & 2018.
3. Revision in scheme of studies for M.Sc Electrical Engineering, fall, 2014 & 2015.
4. Change in nomenclature of M.Sc Electrical Engineering with specialization in power Engineering / M.Sc Electrical Engineering with specialization in Communication Engineering program to be named as M.Sc Electrical Engineering
5. Revision in scheme of studies and course Curriculum for B.Sc Mechanical Engineering, fall, 2018.
6. Revision in scheme of studies and course Curriculum for M.Sc Mechanical Engineering, fall 2015.
7. Revision in scheme of studies and course curriculum for BS Civil Engineering Technology, fall 2013.
8. BS Civil Technology program to be re-named as BS Civil Engineering Technology
9. Revision in scheme of studies and course curriculum for BS Civil Engineering Technology, fall 2018 and onward.
10. Revision in scheme of studies and course curriculum for BS Electrical Engineering Technology, fall 2013.
11. BS Electrical Technology program to be re-named as BS Electrical Engineering Technology
12. Revision in scheme of studies and course curriculum for BS Electrical Engineering Technology, fall 2018.
13. Revision in scheme of studies and course curriculum for BS Mechanical Engineering Technology, fall 2013.
14. BS Mechanical Technology program to be re-named as BS Mechanical Engineering Technology
15. Revision in scheme of studies and course curriculum for BS Mechanical Engineering Technology, fall 2018.

Further, the House agreed to the request of the Principal, College of Engineering & Technology to withdraw item at Sr. No. 07.

Engr. Dawood  
24/12

(AMJAD HUSSAIN JANJUA)  
Deputy Registrar (Acad)  
24/12/18

**Distribution:**

- Principal, University College of Engineering & Technology
- Controller of Examinations
- All Principals of Affiliated College concerned

**C.C:**

- Dean, Faculty of Engineering & Technology
- Secretary to the Vice-Chancellor
- P.A to Registrar

Department of Technical Education  
Scheme of Studies for BS Mechanical Engineering Technology  
Fall 2018 Onward

## Semester-I

| Course Code | Course                 | Credit Hours | Contact Hours |
|-------------|------------------------|--------------|---------------|
| MATH-111    | Applied Mathematics-I  | 3(3+0)       | 3             |
| CS-112      | Computer Applications  | 2(1+1)       | 4             |
| ENG-113     | Communication Skills-I | 3(3+0)       | 3             |
| MT-114      | Applied Physics        | 4(3+1)       | 6             |
| MT-115      | Engineering Drawing    | 3(1+2)       | 7             |
| ISL-116     | Islamic Studies        | 2(2+0)       | 2             |
| Total:      |                        | 17           | 25            |

## Semester-V

| Course Code | Course                      | Credit Hours | Contact Hours |
|-------------|-----------------------------|--------------|---------------|
| MT-311      | I.C Engine                  | 4(3+1)       | 6             |
| MT-312      | Plant Maintenance           | 2(2+0)       | 2             |
| MT-313      | Mechanical Vibrations       | 4(3+1)       | 6             |
| MT-314      | Instrumentation and Control | 4(3+1)       | 6             |
| MT-315      | Production Automation       | 4(3+1)       | 6             |
| Total:      |                             | 18           | 26            |

## Semester-II

| Course Code | Course                  | Credit Hours | Contact Hours |
|-------------|-------------------------|--------------|---------------|
| MT-121      | Machining Processes     | 3(1+2)       | 7             |
| MATH-122    | Applied Mathematics-II  | 3(3+0)       | 3             |
| ENG-123     | Communication Skills-II | 3(3+0)       | 3             |
| MT-124      | Industrial Materials    | 3(3+0)       | 3             |
| MT-125      | Applied Mechanics       | 4(3+1)       | 6             |
| MT-126      | Computer Aided Drafting | 2(1+1)       | 4             |
| Total:      |                         | 18           | 26            |

## Semester-VI

| Course Code | Course                                      | Credit Hours | Contact Hours |
|-------------|---|--------------|---------------|
| MT-321      | Material Handling                           | 2(2+0)       | 2             |
| MT-322      | Renewable Energy & Environmental Technology | 4(3+1)       | 6             |
| MT-323      | Metrology & Gauging                         | 3(2+1)       | 5             |
| MT-324      | Refrigeration and Air Conditioning          | 4(3+1)       | 6             |
| PK. ST-325  | Pakistan Studies                            | 2(2+0)       | 2             |
| MT-326      | Project Management                          | 3(3+0)       | 3             |
| Total:      |   | 18           | 24            |

## Semester-III

| Course Code | Course                          | Credit Hours | Contact Hours |
|-------------|---------------------------------|--------------|---------------|
| MT-211      | Mechanics of Materials          | 4(3+1)       | 6             |
| MATH-211    | Applied Mathematics-III         | 3(3+0)       | 3             |
| MT-212      | Applied Thermodynamics          | 4(3+1)       | 6             |
| MT-213      | Production Planning and Control | 3(3+0)       | 3             |
| MT-214      | Basic Electrical Technology     | 4(3+1)       | 6             |
| Total:      |                                 | 18           | 24            |

## Semester-VII

| Course Code | Course                         | Credit Hours | Contact Hours |
|-------------|--------------------------------|--------------|---------------|
| MT-421      | Supervised Industrial Training | 16(0+16)     | 40            |
| Total:      |                                | 16           | 40            |

## Semester-IV

| Course Code | Course                              | Credit Hours | Contact Hours |
|-------------|-------------------------------------|--------------|---------------|
| MT-221      | Machine Design                      | 4(3+1)       | 6             |
| MT-222      | Industrial and Environmental Safety | 2(2+0)       | 2             |
| MT-223      | Manufacturing Process               | 4(2+2)       | 8             |
| MT-224      | Fluid Mechanics                     | 4(3+1)       | 6             |
| MS-225      | Total Quality Management            | 2(2+0)       | 2             |
| Total:      |                                     | 16           | 24            |

## Semester-VIII

| Course Code | Course                         | Credit Hours | Contact Hours |
|-------------|--------------------------------|--------------|---------------|
| MT-421      | Supervised Industrial Training | 16(0+16)     | 40            |
| Total:      |                                | 16           | 40            |

Total Credit Hours: 137

Total Contact Hours: 229

Principal  
College of  
& Technology  
University of Sargodha

**UNIVERSITY OF SARGODHA**  
**University College of Engineering and Technology**

**Course Curriculum**  
**BS Mechanical Engineering Technology**  
**Fall 2018 onward**

[www.su.edu.pk](http://www.su.edu.pk)

**Department of Technical Education**

Department of Technical Education, BS Mechanical  
Engineering Technology, Fall 2018

**MATH-111 Applied Mathematics-I 3(3+0)**

Theory Cr Hrs, 3  
Lab Cr Hrs, 0

**Objectives:**

1. To review the knowledge and practice the skills acquired in diploma Courses
2. To understand the concept and use of differential equations
3. To learn different methods to solve differential equations

**Course Outlines:**

Real numbers and real line, Functions and their graphs, Rate of change and limits.

Differential Calculus: The derivatives as a function, Differential Rules, The derivative as a rate of change, Derivatives of algebraic functions, Derivatives of exponential functions, Derivatives of trigonometric functions, The chain rule and parametric equations, Implicit differentiation, Inverse functions and their derivatives, Derivatives of inverse trigonometric functions, Derivatives of hyperbolic functions, Findings of horizontal and normal tangents, Extreme values of functions, The mean value theorem.

Integral Calculus: Basic integration formulas, Integration by parts, Indefinite integrals and the substitution rule, Integration of rational functions by partial fractions, Improper integrals, The definite integral, Substitution and area between curves, Volume by slicing and rotation about an axis, Volume by cylindrical shells, length of plane curves, Area of surface of revolution.

Complex numbers, addition, multiplication, subtraction and division of complex numbers and complex plane.

**Text Book:**

1. Thomas G. B. and Finney R. L. "Calculus and Analytic Geometry" (13th edition)
2. Kreyszig E. "Advanced Engineering Mathematics", John Wiley and Sons, USA (10th edition)
3. Cohen H. L. "Mathematics for Scientists and Engineers", Prentice-Hall, UK.

**CS-112 Computer Applications 2(1+1)**

Theory Cr Hrs, 1  
Lab Cr Hrs, 1

**Objectives:**

To enable students to comprehend fundamentals of computer essentials

**Course Outlines:**

**Basic Computer Organization:** Major building blocks; their functions & interconnections.

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TECHNOLOGY  
2018

~~Number Systems: Number conversion, Data Representation & Data structure.~~  
 Processed operation, Memory & I/O of a computer

~~Languages: High level & Low Level Languages, Compilers interpreters,~~  
 operating systems, computer programming.

~~Application Packages: Word processors, Data Bases, Spread Sheets.~~

~~Computer Networking Fundamentals~~

**Recommended Books:**

1. Charles Parker, "Computers today and tomorrow"
2. Tucker A. B. "Fundamentals of Computing", McGraw Hill Book Company

**ENG-113**

**Communication Skills-I**

**3(3+0)**

**Theory Cr Hrs, 3**

**Lab Cr Hrs, 0**

**Objectives:**

To understand the importance and basic concepts of communication

To enhance the listening skills and to become active listener

To enhance the reading skills and to become active reader

To improve the writing skills in general

**Course Outlines:**

Introduction to Communication, Importance, Theories, Barriers, Components, The Seven C's for Effective Communication, Listening Skills Blocks, Thinking and Feeling Notes Taking, Giving Feedback Reading Skills Active Reading Techniques, Skimming, General Reading and Careful Reading Introduction to Writing Skills Planning, Drafting and Editing Emphasis and Connections Grammar and Vocabulary Technical and Business Vocabulary, Constructing Formal Sentences.

**Text Book:**

1. Murphy H. A., Hildebrandt H. W. and Thomas J.P., "Effective Business Communications", McGraw-Hill, USA (Latest Edition).

**Reference Books:**

1. T Norman S., "We're in Business", Longman Group Ltd., UK (Latest Edition)
2. Thomson A. J. and Martinet A. V., "A Practical English Grammar", Oxford University Press, UK (Latest Edition)

**MT-121**

**Machining Processes**

**3(1+2)**

**Theory Cr Hrs, 1**

**Lab Cr Hrs, 2**

**Objectives:**

To enable the student to understand:-Mechanism of Chip formation.  
Cutting tool materials and cutting fluids.Lathe operations, milling operations, planning. Shaping and broaching operations.

**Course Outlines:**

Cutting Tool Materials and Cutting fluids: Steels, Carbides, Carbides Coated Tools, Ceramics, Diamond tools, abrasives, stellites, Cutting Fluids properties, purposes and their types, Lathe Operations: Turning parameters, further work on lathe machines i.e. eccentric and form turning, under cutting, centre hole, Calculation of MMR, Power and Cutting Time, High Precision Machining, Hard Turning, Cutting Screw Threads (single, double and triple start), Lathe accessories and attachments, Semi-Automatics and automatics. Milling Operations, Milling parameters, Calculations of MMR, power and Cutting Time, Milling attachments, Accessories, Copy Milling, Die Sinking, Index Milling Planning, Shaping and Broaching Operations: Principle, Tools, applications, Gear Manufacturing: Machining, Form Cutting, Shaping, Hobbing Finishing Operations: Grinding, Honing, Lapping, Polishing and Buffing

**Recommended Books:**

1. W A J Chapman, "Workshop Technology" (Part I, II, III)
2. SK Hajra Choudhury, "Elements of Workshop Technology(Vol II)-Machine Tools"

**Reference Books:**

1. Genevro W A J and Heineman S S "Machine Tools: Processes and Applications", Prentice Hall UK
2. Kibbe R R Neely J E Neyer R O and White W T, "Machine Tool Practice" Prentice Hall UK

MT-115                      Engineering Drawing                      3(1+2)

Theory Cr Hrs, 1

Lab Cr Hrs, 2

**Course Outlines:**

Introduction: Types of lines, lettering, dimensioning, use of pencil and drawing instruments, planning of drawing sheet. Projections : Types of projections, orthographic projections, plane of projections, four quadrants, projection of points, projection of straight lines, examples with different quadrants, traces of a line, true length of a line, inclination to both the planes, projection of oblique and auxiliary planes. Loci of Points and Generated Curves: Loci of points and straight lines. Cycloid, epicycloid, involute, archemedian spiral Development of Solids: Types of solids, polyhedra, solids of revolution, prism, pyramid, cylinder, cone, sphere, Intersection of Surfaces: Intersection of cylinder and cylinder, cone and cylinder, cone and cone, cone and prism Projection of Solids: Projection of various solids in simple position and inclined positions Section of Solids: True shape of section on auxiliary plane of various solids. Isometric and pictorial projections of solids/machine parts,

making of freehand sketches from solid objects and from orthographic projections. Sections of joints, screw thread systems, nuts and bolts, keys and cotter, coupling and simple bearings, pipe connections and engine details, preparation of assembly drawings. Introduction to computer aided engineering drawing and use of software/package.

#### Recommended Books:

1. Bertoline Wiebe, Miller, Mohler, Irwin, "Technical Graphics Communication", McGraw-Hill 1997
2. Abbot, "Practical Geometry & Engineering Graphics"
3. Craft, Meyers & Boyer, "Engineering Graphics"
4. Gary R. Bertoline and Eric N. Wiebe, "Technical Graphics Communication, 3<sup>rd</sup> Edition", McGraw-Hill 19
5. D.F. Rogers and J.A. Adams, "Mathematical Elements for Computer Graphics", McGraw-Hill 1976

MT-114

Applied Physics

4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

#### Objectives:

Scientific notation and significant figures. Unit in different systems

#### Course Outlines:

Vectors: Review of vectors, Vector derivatives, Line and surface integrals, Gradient of scalar.

Mechanics: Coordinate systems. Motion under constant acceleration, Newton laws and their applications, Uniform circular motion. Vortex Motion, Frictional forces. Work and energy. Potential energy, energy conservation, energy and our environment.

Electrostatic and magnetism: Coulombs law. Gauss's law. Electric field around conductors. Dielectrics. Magnetic fields. Magnetic force on current. Semiconductor Physics: Energy levels in a semiconductor. Hole concept. Intrinsic and extrinsic regions. Law of mass action. P -N junction. Transistor. Waves and Oscillation: Free oscillation of systems with one degree of freedom. Classical wave equation. Transverse modes for continuous string. Standing waves. Dispersion relation for waves.

Optics and Laser: Basic introduction to Optics and Laser. Diffraction grating. Lasers, population inversion. Resonant cavities. Quantum efficiency. He-Ne, Ruby and CO<sub>2</sub> lasers. Doppler effect and sonic boom.

Modern Physics: Photoelectric effect, Compton effect. Bohr theory of hydrogen atom, atomic spectra, reduce mass, De-broglie hypothesis braggs law, electron microscope, zeeman effect, atomic nucleus, mass energy relation, binding energy, nuclear forces and fundamental forces. Exponential decay and half-life

#### Recommended Books:

David Halliday, R. Resnick. "Physics" (Latest Edition)

MT-126

Computer Aided Drafting

2(1+1)

Theory Cr Hrs, 1

Lab Cr Hrs, 1

**Objective:**

After completion of the subject the student will be able to understand different techniques used for drawing in 2D and 3D Auto Cad.

**Course Outline:**

Introduction to AutoCAD (Latest version available), AutoCAD interface, toolbars, Menus, Coordinate System, and AutoCAD commands uses for creating organizing modifying saving & plotting 2D drawings Drawing in layers, object properties, hatching, text dimensioning, blocks, attributes, external reference, auto cad design center Introduction to 3D modeling, solid modeling, surface modeling & wire frame modeling. Extrude, Revolve, Union, Subtract, Intersect & other 3D commands, 3D view, view ports, model space, paper space & layouts Introduction to product design. Basic concepts in product designing using pro engineering software (feature – based) parametric solid modeling Creating simple mechanical parts Assembling simple mechanical parts Generating 2D drawings of the parts & assemblies.

**Recommended Books:**

1. Auto Desk, "AutoCAD user guide"
2. Auto Desk, "AutoCAD command reference"
3. George Omura, "Mastering AutoCAD"

MATH-122

Applied Mathematics-II

3(3+0)

Theory Cr Hrs, 3

Lab Cr Hrs, 0

**Objective:**

To develop an understanding of the knowledge/skill of Mathematics and to apply these in engineering problems.

**Course Outline:**

Differential equation: Basic concepts and ideas, geometrical interpretation of first and second order differential equations, separable equations, equations reducible to separable form, exact differential equations, integrated factors, Linear first order differential equations, Bernoulli's differential equation. Families of curves orthogonal trajectories and applications of differential equations of first order to relevant engineering systems. Homogeneous linear differential equations of second order, homogeneous equations with constant coefficients, the general solutions.



initial and boundary value problems, D- operator, complementary functions and particular integrals. Real, complex and repeated roots of characteristics equations. Cauchy equation, non- homogeneous linear equations. Applications of higher order linear differential equations. Ordinary and regular points and corresponding series solutions. Concept of sequence and series.

**Recommended Books:**

1. C.R. Wiley, "Advanced Engineering Mathematics 6th Edition", McGraw- Hill Education
2. Erwin Kreyszig, "Advanced Engineering Mathematics 10th Edition", John Wiley & Sons

MT-124

Industrial Materials

3(3+0)

Theory Cr Hrs, 3

Lab Cr Hrs, 0

**Objective:**

Enable the student to comprehend: The concept of crystal geometry. BCC, FCC and HCP, The material composition, composite materials. Materials properties and material substitution. The basic heat treatment process, the effect of alloying elements on mechanical properties of steel. Common heat treatment processes of non-ferrous metals. Concept of non-metallic materials. application of plastics, ceramics glass and rubber.

**Course Outline:**

Concept of crystal geometry, Crystalline structure of metals, BCC, FCC and HCP structure, formation of alloys, binary alloys, phase diagram of binary alloys, cooling curves, solid solution, eutectic alloy, intermediate compounds, iron-iron carbide equilibrium diagram, micro structure of plain carbon steels, effect of carbon percentage and rate of cooling on micro structure and properties of plain carbon steel. Heat treatment processes, Annealing, Normalizing, Hardening, Tempering, Hardenability, Case-hardening, Carburizing, Nitriding, Cyaniding, Flame & induction Hardening, Effect of alloying elements on mechanical properties of steel. Cast Irons, Gray Cast iron. White Cast Iron and Malleable cast Iron, Non-ferrous Metals and alloys. Mechanical properties of copper and aluminum, copper zinc and copper tin alloys. Composite Materials and their applications, Polymers and its types, polymerization applications, additives to polymers etc

**Recommended Books:**

- V John, "Introduction to Engineering Materials"  
 Degarmo Black & Kohser Amstead, "Materials and Processes in Manufacturing" (latest Edition)  
 Ostwald & Begeman, "Manufacturing Process (8<sup>th</sup> Edition)"  
 Avner, "Introduction to Physical metallurgy"

PK. ST-325

Pakistan Studies

2(2+0)

Theory Cr Hrs, 2

Lab Cr Hrs, 0

**Objective:**

Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan. Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

**Course Outline:**

## Historical Perspective

- a) Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah
- b) Factors leading to Muslim separatism
- c) People and Land  
Indus Civilization  
Muslim advent  
Location and geo-physical features.

## Government and Politics in Pakistan Political and constitutional phases:

- d) 1947-58
- e) 1958-71
- f) 1971-77
- g) 1977-88
- h) 1988-99
- i) 1999 onward

## Contemporary Pakistan

- j) Economic institutions and issues
- k) Society and social structure
- l) Ethnicity
- m) Foreign policy of Pakistan and challenges
- n) Futuristic outlook of Pakistan

**Recommended Books:**

- Burki, Shahid Javed. State & Society in Pakistan, The Macmillan Press Ltd 1980.
- Akbar, S. Zaidi. Issue in Pakistan's Economy. Karachi: Oxford University Press, 2000.
- S.M. Burke and Lawrence Ziring. Pakistan's Foreign policy: An Historical analysis. Karachi: Oxford University Press, 1993.
- Mehmood, Safdar. Pakistan Political Roots & Development. Lahore, 1994. Wilcox, Wayne. The Emergence of Bangladesh., Washington: American Enterprise, Institute of Public Policy Research, 1972.

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 Technology  
 of Bangladesh

MT-125

Applied Mechanics

4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

**Course Outline:**

**INTRODUCTION TO STATICS:** Mechanics: Basic concepts; Scalar and vector; Vector addition, subtraction and product, concept and unit of measurements of mass, force, time, space

**FORCE SYSTEM:** Force: Introduction; Two-dimensional force system; Rectangular components; Law of triangle, parallelogram, moment, couple, resultants; solution of problems

**EQUILIBRIUM:** Equilibrium in two dimensions; Equilibrium conditions; Free body diagram; solution of problems.

**BEAMS:** Definition; Types of beams; Bending moment and shearing force in simply supported beams and cantilevers; Solution of problems.

**GEOMETRICAL PROPERTIES OF PLANE AREA:** Introduction; Center of gravity and centroid; Moment of inertia for an area; Parallel – Axis theorem for an area; Radius of gyration of an area; Solution of problems

**KINEMATICS OF RECTILINEAR AND CURVILINEAR MOTION:** Introduction; Displacement; Types of motion; Speed, velocity, acceleration; Equation of motion under uniform acceleration; Normal and tangent acceleration. Solution of problems

**FRICTION:** Introduction; Types of friction; Laws of solid friction; Co-efficient of friction; Solution of problems

**WORK AND ENERGY:** Work, Energy, Power, Impulse; Momentum; Simple harmonic motion and free vibration. Introduction to simple trusses and cables. Solution of problems

**Recommended Books:**

Hibler, RC, "Engineering Mechanics", Prentice Hall.

MT-211

Mechanics of Materials

4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

**Objective:**

Enable the students to understand application of forces & their effects on different mechanical & structural members in statics & Dynamics.

**Course Outline:**

Mechanical properties of Materials, tensile, compression and shear stress & shear strain, Elastic constants & their relationships, compound bars, thermal stresses, Moments of inertia, shearing force and bending Moment, torsion of circular bars,

hollow-circular shafts, strain-Energy.

**Recommended Books:**

F.P Beer & ER Johnston, "Mechanics of Materials"

FV Warnock P.P Benham & R.J Crawford, "Mechanics of Engg Materials"

F.Singar, "Strength of Materials"

**MT-212                      Applied Thermodynamics                      4(3+1)**

**Theory Cr Hrs, 3**

**Lab Cr Hrs, 1**

**Objective:**

Enable the student to comprehend:

The laws of Thermodynamic and their application to engineering thermodynamic systems. IC Engines, Air Compressors, Steam Engines Entropy, irreversibility application to heat engine Turbines, Air standard Efficiency, Thermal and mechanical efficiency. Air fuel ratio, octane number and cetane number

**Course Outline:**

Basic concepts of thermodynamics: Thermodynamics and energy, Closed and open system, Properties of a system, State and equilibrium, Processes and cycles, Pressure and its measuring instruments

Properties of Pure Substances: Pure substance and its phase change processes, Property diagram, Specific heats, Internal energy, enthalpy and specific heats of ideal gases, liquids and solids

Energy Transfer by Heat, Work and Mass: Energy transfer by work, Flow work and energy of the flowing fluid, Modes of heat transfer

Laws of Thermodynamics: First law of thermodynamics, Energy balance for closed systems and for steady flow systems, Energy balance for closed systems and for unsteady flow systems, Second law of thermodynamics, Explanation of the second law, Heat engines, refrigeration and heat pumps, Carnot cycle and its principles, Perpetual motion machines, Reversible and Irreversible processes

Entropy: Definition and description of entropy, Increase of entropy principle, Entropy change of pure substances, Isentropic processes, T-S relations, Isentropic efficiencies of steady flow devices

**Recommended Books:**

Rayner Joel, "Basic engineering Thermodynamic"

Youns A Cengel and Michael A Boles, "Thermodynamics an Engg Approach" (latest edition)

**MATH-211                      APPLIED MATHEMATICS-III                      3(3+0)**

**Theory Cr Hrs, 3**

**Lab Cr Hrs, 0**

Department of Technical Education, BS Mechanical Engineering Technology, Fall 2018

*System*  
 Department of Technical Education  
 BS Mechanical Engineering Technology  
 Fall 2018

**Objectives:**

1. To review the knowledge and practice the skills acquired in diploma Courses
2. To understand the concept of matrices and determinants
3. To understand the concept and use of partial differential equations and their applications

**Course Outlines:**

1. Linear Algebra: Basic concepts of matrices and determinants, addition, subtraction, multiplication, linear system of equations and their solutions, Gauss elimination technique, Row reduced Echelon form, Rank of the matrices, Inverse of matrices, Gauss Jordan method, Determinants, Cramm's rule, Eigen values and Eigen vectors.
2. Vector differential calculus, Gradient, Divergence, and curl, and concepts of vector integral calculus.
3. Partial Differential equations: Fourier series, Basic concepts of Partial Differential Equations, Wave equation, Heat Equation, Laplace's equation, Poisson Equation and their solutions by using Fourier Series, and Laplace transforms.

**Recommended Books:**

1. C.R. Wylie, "Advanced Engineering Mathematics 6th Edition", McGraw-Hill Education
2. Erwin Kreyszig, "Advanced Engineering Mathematics 10th Edition", John Wiley & Sons

MT-214

Basic Electrical Technology

4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

**Objective:**

Enable the students to understand the basics of electronics and different electronic components used in industries

**Course Outline:**

Insulators, semiconductors and metals; PN junction diode, characteristics and analysis, power supplies, rectifier circuits; transistors, constructions and characteristics of bipolar junction transistor (BJT); construction and characteristics of FET; amplifiers; basic principles, static and dynamic load lines, classification, frequency response; integrated circuits; monolithic and hybrid integrated circuits; integrated circuits for industrial controls; transducers, displacements sensing, load cells, velocity sensing, force sensing, photo sensors, laser devices; construction and working of digital multi-meters, oscilloscopes, signal generators; number system, Boolean algebra, logic gates, combinational logic design; sequential circuits and logic design, introduction to microprocessors and micro controllers, I/O devices, interfacing to memory and I/O devices.

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**List of Practical's:**

1. To study the V-I characteristics of a Semiconductor Diode
2. To demonstrate the use of a Semiconductor Diode as a half-wave and full wave rectifier
3. To demonstrate operation and characteristics of BJT.
4. To demonstrate operation and characteristics of FET.
5. To demonstrate operation of single stage transistor amplifier
6. To demonstrate the design and operation of integrated circuits.
7. Transistor familiarization and function behavior.
8. To demonstrate the design and operation of Analog type Integrated Circuits.
9. To demonstrate the design and operation of Potentiometer Sensor
10. To demonstrate the design and operation of strain-page load cell
11. To demonstrate the design and operation of Digital Multimeters

**Recommended Books:**

1. Floyd, "Electronic Devices"
2. R. Tokhem, "Microprocessor Fundamentals"
3. Floyd, "Digital Electronics"
4. Chute, "Electronics in Industry", McGraw Hill, UK

ENG-123

Communication Skills-II

3(3+0)

Theory Cr Hrs, 2

Lab Cr Hrs, 0

**Course Outline:**

Communication Environment: Organizational Structure, International Communication, Nondiscriminatory Communication, Communication Channels.

Communication and Technology: Presentation Graphics and Word Processing, Fax, E-mail, Internet and Voice Mail, CD-ROM and Online Databases, Teleconferencing, Audio Visual Aids.

Presentation Skills: Defining objective, audience analysis, style and tone, credibility, opening, closing and main ideas, use of Audio Visual Aids. Meetings and Interviews: Participating in Meetings, Chairing a Meeting, Asking and Answering Questions in Meetings, Preparing Resumes, Preparing for Interviews, Asking and Answering Questions in Interviews. Letters and Memos: Formats, Positive and Negative Messages, Persuasive Communication,

Requests Technical Report Writing: Introduction and Importance, General Formats, Short and Long Reports, Proposals, Quoting References.

**Recommended Books:**

1. Murphy H. A., Hildebrandt, H. W. and Thomas J.P., "Effective Business Communications", McGraw Hill USA
2. Morrissey G.L., Sechrest T.L. and Warman W.B., "LOUD AND CLEAR", Addison-Wesley Publishing Company, USA
3. Beebe S.A. and Beebe S.J., "PUBLIC SPEAKING", Allyn and Bacon, USA.

Department of Technical Education, BS Mechanical Engineering Technology, Fall 2018

ISL-116

ISLAMIC STUDIES

2(2+0)

Theory Cr Hrs, 2

Lab Cr Hrs, 0

**Objectives:**

- To provide Basic information about Islamic Studies
- To enhance understanding of the students regarding Islamic Civilization
- To improve Students skill to perform prayers and other worships
- To enhance the skill of the students for understanding of issues related to faith and religious life

**Detail of Courses:**

Introduction to Quranic Studies: Basic Concepts of Quran, History of Quran, Uloom-ul-Quran

Study of Selected Text of Holly Quran: Verses of Surah Al-Baqra Related to Faith (Verse No-284-286), Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18), Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11), Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77), Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)

Study of Selected Text of Holly Quran: Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.), Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment, Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14)

Seerat of Holy Prophet (S.A.W) –I: Life of Muhammad Bin Abdullah ( Before Prophet Hood), Life of Holy Prophet (S.A.W) in Makkah, Important Lessons Derived from the life of Holy Prophet in Makkah

Seerat of Holy Prophet (S.A.W) –II: Life of Holy Prophet (S.A.W) in Madina, Important Events of Life Holy Prophet in Madina. Important Lessons Derived from the life of Holy Prophet in Madina

Introduction To Sunnah: Basic Concepts of Hadith, History of Hadith, K inds of Hadith, Uloom –ul-Hadith, Sunnah & Hadith, Legal Position of Sunnah

Selected Study from Text of Hadith Introduction To Islamic Law & Jurisprudence: Basic Concepts of Islamic Law & Jurisprudence, History & Importance of Islamic Law & Jurisprudence, Sources of Islamic Law & Jurisprudence, Nature of Differences in Islamic Law, Islam and Sectarianism

Islamic Culture & Civilization: Basic Concepts of Islamic Culture & Civilization, Historical Development of Islamic Culture & Civilization, Characteristics of Islamic Culture & Civilization, Islamic Culture & Civilization and Contemporary Issues

Islam & Science: Basic Concepts of Islam & Science, Contributions of Muslims in the Development of Science, Quranic & Science

Islamic Economic System: Basic Concepts of Islamic Economic System, Means of Distribution of wealth in Islamic Economics, Islamic Concept of Riba, Islamic Ways of Trade & Commerce

Political System of Islam: Basic Concepts of Islamic Political System, Islamic Concept of Sovereignty, Basic Institutions of Govt. in Islam

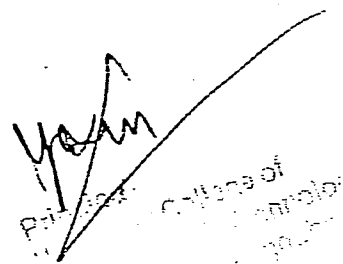
Islamic History: Period of Khlaft-E-Rashida, Period of Ummayyads, Period of Abbasids

Social System of Islam: Basic Concepts of Social System of Islam, Elements of Family, Ethical Values of Islam

**Reference Books:**

1. Hameed ullah Muhammad, "Emergence of Islam", IRI, Islamabad
2. Hameed ullah Muhammad, "Muslim Conduct of State"
3. Hameed ullah Muhammad, "Introduction to Islam"
4. Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law", leaf Publication Islamabad, Pakistan.
5. Ahmad Hasan, "Principles of Islamic Jurisprudence", Islamic Research Institute, International Islamic University, Islamabad (1993)
6. Mir Waliullah, "Muslim Jrisprudence and the Quranic Law of Crimes", Islamic Book Service (1982)
7. H.S. Bhatia, "Studies in Islamic Law, Religion and Society", Deep & Deep Publications New Delhi (1989)
8. Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia", Allama Iqbal Open University, Islamabad (2001)

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breakers, Orthogonal & Oblique cutting, Cutting forces in conventional turning, Friction & heat sources in cutting, surface finishing processes, Lapping, Honing, Super finishing, Polishing, Buffing, Electroplating, Galvanizing, Metal Spraying  
 Cutting Tools: Single point tool Geometry, Multi point tools, Tool life & wear, Tool failure, Factors affecting tool life, Measuring tool life, Tool material & its characteristics, Cutting fluids, Purposes, Types & properties of cutting fluids:  
 Machining Processes: Broaching & broaching machines, Press machine, Types of Press machines, Press work operations Sheet Metal Forming: Sheet metal characteristics, Formability of sheet metals, Bending sheet & plate, Tube bending & forming, Deep drawing, Super plastic forming Jigs & Fixtures: General Design principle, Elements of Jig, Locating Devices & Clamping Devices  
 Non-Conventional Machining Processes: Ultrasonic machining, Abrasive-jet machining, Water-jet machining, Electrical discharge machining (EDM), electromechanical machining & grinding, Laser beam machining, Electron beam machining, Chemical milling, Chemical Blanking, Chemical Engraving

#### List of Practical's:

1. Study of Broaching machine.
2. Study of Press machine.
3. Practice on press machines to make different shapes.
4. Study of bending machine.
5. Bending Sheet metals of different thickness.
6. Practice on making of simple jigs and clamping & locating devices.
7. Mini Project on making a simple Jig or Fixture.

#### Recommended Books:

1. SK Hajra Choudry, "Elements of Workshop Technology Vol. II"
2. BH Amstead & PF Ostwald, "Manufacturing Processes"

MT-213

Production Planning and Control

3(3+0)

Theory Cr Hrs, 3

Lab Cr Hrs, 0

#### Objective:

Enable the students to understand skills in forecasting, inventory control, JIT and new concepts in production planning

#### Course Outline:

Forecasting: Introduction, Forecasting Approaches, Time Series Forecasting Techniques, Casual Forecasting Techniques, Role of Computer in Forecasting  
 Inventory Management: Inventory Systems, Economic Lot Size, Quantity Discounts, Safety Stock Level Just-in-Time Systems: JIT Production, Kanban Supply-Chain Management: Significance, Purchasing Strategies, Purchasing Management, Materials Management MRP and MRP-II: Master Production Schedule, Bill of Materials, Resource Requirements, MRP Management Short Term Scheduling Tactics: Job Shop Scheduling, Shop Loading, Sequencing, Line Balancing  
 Queuing Theory: Introduction, Queue Characteristics, Queuing Models, Introduction

to Simulation

**Recommended Books:**

1. Render B and Heizer J, "PRINCIPLES OF OPERATIONS MANAGEMENT", Prentice-Hall, Inc. USA
2. Littlechild S., "OPERATIONS RESEARCH IN MANANGEMENT", Prentice Hall, UK.
3. Tersine R J., "PRINCIPLES OF INVENTORY AND MATERIALS MANAGEMENT", Prentice Hall, UK.
4. Adam E E and Eber R J., "PRODCTUION AND OPERATIONS MANAGEMNET", Prentice Hall, UK

MT-224

Fluid Mechanics

4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

**Objective:**

Enable the students to understand different properties of fluids in statics and kinematics and also will be familiar with flow and pressure measuring instruments.

**Course Outline:**

Introduction: Development of fluid dynamics, distinction between solid and fluid, gas and liquid, properties of fluids, Density, specific weight, specific volume, specific gravity, compressible and incompressible fluids, ideal fluids, viscosity and its units, surface tensions, vapor pressure of liquids etc. Fluid Statics: Pressure, variation of pressure in a static fluid, pressure head, review of types of pressures, pressure measurement gauges, Force on plane area, center of pressure, force on curved surface, Buoyancy and stability of submerged and floating bodies. Kinematics of Fluid Flow: Types of flow, flow rate and mean velocity, equation of continuity, flow net, velocity and acceleration in steady and unsteady flow. Measurement of flow rate velocity: Energy Consideration in Steady Flow: Kinetic energy of a flowing fluid, potential energy, internal energy, general equation for steady flow of any fluid, energy equation for steady flow of incompressible fluids. Bernoulli's theorem, Head, Power consideration in fluid flow cavitations, energy equation for steady flow of compressed fluids, equation of steady motion along a stream line for ideal fluid and Euler's equation, equation of steady motion along a stream line for real fluid, Hydraulic gradient, energy line, problems, Pressure in fluid flow and its measurement, set trajectory, flow in a curved path, vortex, types of vortex.

Similitude and Dimensional analysis: Definition and importance, geometrical, kinematic and dynamic similarity, dimensionless ratios, scale ratios, dimensional analysis.

Steady & Incompressible Flow in Pressure conduits: Laminar and Turbulent flow, critical Reynold's number, hydraulic radius, general equation for friction, Darcy-Weisbach pipe friction equation, laminar flow in circular pipes, turbulent flow in circular pipes, pipe roughness, chart for friction factor, fluid friction in non-circular conduits, empirical equations for pipe flow. Flow measurements, Pitot tubes,

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venturimeter, orifices, nozzles.

### List of Practicals:

1. Study of Hydraulic Bench
2. To determine the co-efficient of Venturimeter & discuss its application.
3. To calibrate the given rectangular notch and discuss its application.
4. To calibrate a triangular notch and discuss its application.
5. To find the co-efficient of discharge
6. To calibrate the given pressure gauge & discuss its application.

### Recommended Books:

1. Daugherty and Franzini, "Fluid Mechanics with Engg. Application"
2. Victor L. Streeter, "Fluid Mechanics", McGraw Hill
3. K R Arora, "Fluid Mechanics and Hydraulic Machinery", Standard Publisher India

MT-311

I.C Engines

4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

### Objective:

Understand Engine classification.

Understand working cycles of I.C. Engines.

Understand Systems of I.C. engines.

Understand servicing and overhauling of I.C. Engines.

### Course Outline:

Introduction: History and development of I.C. Engines

Classification of I.C. Engines: Spark ignition Engines, Compression ignition Engines,

Fundamental difference between SI and CI Engines Working Cycles: Four stroke

petrol engine, Two Stroke petrol engine, Four Stroke Diesel engine, Two stroke

Diesel engine, Comparison of petrol and diesel engines, Comparison of 4-stroke and

2-stroke engines Fuel air mixing: SI engines and CI engines Carburetion:

Construction of simple carburetor, Types of carburetors Carburetion performance:

Full range of load, Full range of speed Fuel injection in CI engines: Air injection

system, Solid injection system and Their merits and demerits Fuel injection system

performance: Full Range of load, Full range of speed Spark ignition systems: Battery

ignition system, Magneto ignition system, Electronic ignition system Ignition

advance and ignition retard: Their effect on the output of reciprocating engines

Engine cooling and lubrication: Necessity of cooling, Types of cooling system,

Necessity of Lubrication, Types of lubrication system

1. Turbocharged engines: Installed in road vehicles, Installed in industry
2. Servicing and overhauling: Vehicle engine, Industrial engines

### Lab Outline:

1. Measurement of cylinder pressure variation as function of time
2. Measurement of cylinder temperature as function of time
3. Engine performance variation with ignition retard

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4. Engine performance variation with ignition advance
5. Performance comparison of a petrol engine with and without fuel injection
6. Effect of fuel injection pressure variation on performance of petrol engine
7. Performance of diesel engine at different injection pressure
8. Measurement of ignition delay in petrol engine
9. Measurement of ignition delay in diesel engine
10. Effect of intake charge pressure on performance of diesel engine
11. Effect of intake charge pressure on performance of petrol engine

#### Recommended Books:

1. C.I Tayler, "I.C. engines"
2. J.B Heywood, "I.C. Engines Fundamentals"
3. Richard stone, "Introduction to I.C. engines"
4. Dr. R.K signal, "Internal combustion engines"

MT-312

Plant Maintenance

2(2+0)

Theory Cr Hrs, 2

Lab Cr Hrs, 0

#### Objective:

List of Practicals Enable the students to comprehend different types of maintenance, cost control & maintenance and the application of computer in maintenance

#### Course Outline:

Equipment Installation: Selection of Appropriate Location for Installation. Design and Preparation of Foundation for Equipment. Provision of Supplies and Services. Transportation, Unpacking and checking the equipment as per specifications. Checklist of Precautions to be observed. Commissioning of the Equipment

Organization and Management of Maintenance function: Introduction to the Theory and practice of maintenance. Operating policies Operating practices to reduce maintenance control. Reports from maintenance deptt. Area and Centralized Maintenance control. Considerations in using outside contractors. Incentive payment for maintenance workers. Human factors in maintenance

Establishing the Costs and Controls of Maintenance: Work measurement. Work authorization and control. Rating and evaluating maintenance. Work simplification in maintenance. Estimating repair and maintenance costs. Cost control for effective operation. Small plant maintenance control. Maintenance Control and inventory control. Maintenance storerooms.

Applying the computer to maintenance management and control: An introduction to computers in maintenance. Automating maintenance information by computer. Computerized planning and scheduling Computer terminology defined. Maintenance of plant facilities and housekeeping: Industrial Housekeeping. Painting and protective coatings. Maintenance of elevators and special lifts

Maintenance of mechanical equipment: Plain and rolling bearings. Flexible couplings and chains for power transmission, Overhead and Gantry Cranes. Chain hoists Drives

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Maintenance of service equipment: ~~Air conditioning equipment. Ventilating fans and exhaust systems. Dust collecting equipment. Centrifugal Pumps, Reciprocating Air Compressors Valves, Piping, Scaffolds and Ladders.~~

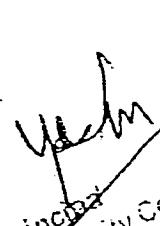
Lubrication: Lubricants. Lubrication Systems, Devices and Procedures

Preventive and predictive Maintenance, expose factor.

#### Recommended Books:

1. Higgins L.R., "Maintenance Engineering Handbook", McGraw Hill Book Company, UK.
2. Weaver R, "Manger's Guide to Machinery Maintenance", Prentice Hall, UK.
3. Pertocelly K and Press F, "Commercial and Institutional Maintenance Management", Prentice Hall, UK
4. Lamb R. G, "Availability Engineering and Management for Manufacturing plant performance", Prentice Hall, UK.

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MT-313      Mechanical Vibrations      4(3+1)

Theory Cr Hrs, 3  
Lab Cr Hrs, 1

**Objective:**

Enable the students to comprehend the basic concepts and terminologies in Mechanical Vibration, vibration in different mechanical systems & methods to remove/reduce vibration.

**Course Outline:**

Vibration: Introduction, types of vibration, basic concepts and terminologies  
Revision of matrix algebra: Characteristic equations, solution methods, free vibration, equation of motion, energy methods, series and parallel combination, viscously damped free vibration, logarithmic decrement, coulomb's damping. Harmonically excited vibration: Forced harmonic vibration, rotating unbalanced, and vibration measuring instruments. Mechanical system: Gravity pendulum, spring-mass vibrating system, compound gravity pendulum, stiffness, potential energy, stability, torsional pendulum, free vibration and resonance. Physical stiffness of elements: Rods, beams, stiffness coefficients as matrix elements. Eigen value analysis: Two degree of freedom problems, three degree of freedom problems, determination of modes of vibration. Rayleigh's method and its applications

**List of Practical's:**

1. Demonstration on simple spring mass system and related calculation
2. Demonstration simulation of beams and rod vibration
3. Demonstration on damped vibration and analysis
4. Computer simulation of whole range of vibrating components
5. Application of computer for solving set of equations

**Recommended Books:**

1. William, T. and Thompson, "Vibration theory and applications"
2. Kelly, "Fundamentals of mechanical vibrations"
3. S S Rao, "Mechanical Vibration"

MT-314      Instrumentation and Control      4(3+1)

Theory Cr Hrs, 3  
Lab Cr Hrs, 1

**Objective:**

Enable the students to know about basics of control system & measuring instruments.

**Course Outline:**

Introduction to control system, input & output, open loop, closed loop control system & feedback control system, Elements of a general control system & their examples, transfer function.

Transducers, classification of Transducers

Study of different indicating, measuring & recording instruments for length force, torque, frequency, pressure, flow & temperature

Free body Diagram and Newton's law of motion, operational notation, grounded chair representation, series & parallel laws. Equation of motion for a spring mass & damper system, Electrical & Mechanical analogous circuits. Stability:- Concept, routh criterion & root locus method for stability measurements.

#### List of Practical's:

1. Experimental Determination of Transfer function of a given mechanical system
2. Experimental study of different types of pressure measuring devices
3. Experimental study of different types of temperature measuring devices
4. Use of oscilloscopes

#### Recommended Books:

1. Francis H Raven, "Automatic control"
2. Richard C dorf, "Modern control system"
3. J.J Distofano et al, "Automatic control"

MT-321

Material Handling

2(2+0)

Theory Cr Hrs, 2

Lab Cr Hrs, 0

#### Objective:

After going through this subject the student will be able to know about the various types of conventional material handling equipments along with modern and latest equipment and devices e.g: AGVs, Robots, Pallet trucks, different types of electronic sensor using devices etc

#### Course Outline:

The material-handling problem: Introduction, Material Handling Equipment Marketing, Principles of material handling, factors affecting material handling  
Bulk-Material-Handling Equipment: Belt Conveyers, Bucket Elevators and Bucket Conveyers, Screw, Conveyers, Vibratory Conveyers, Feeders and Screws, Vehicle Bulk Handling Systems, Marine Bulk-Material Handling

Packaged-Material-Handling Equipment: Pallets and Palletizing Operations, Package and Unit Conveyer Systems, Belt Package Conveyer Power Roller conveyer, Conveyer Turns and Switches, Conveyer Sortation and Accumulation Systems, Pallet Conveyers.

Monorail conveyer Systems: Light Duty Chain and Cable System, Heavy Duty Systems, Power-and Free Systems, Powered-Carrier Monorail Systems

Counterbalanced Forklift Trucks: Reach-Type Non-Aisle Forklift Trucks, Narrow-Aisle Turret-Type Forklift Trucks, Side-Loading Forklift Trucks,

Miscellaneous Material Handling Equipment: Vehicular Unit Handling equipment, Pallet Transporters and Material Handling Tools. Towline Systems, Tractor-Trailer Trains.

Integrated Material Handling Systems: Automated Guided Vehicles and Their  
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Applications, Use of Robots

### Recommended Books:

1. Sims Jr. E.R, "PLANNING AND MANAGING INDUSTRIAL LOGISTICS SYSTEMS", Elsevier, Amsterdam.
2. Maynard's, "INDUSTRIAL ENGINEERING HANDBOOK", McGraw Hill, UK.
3. Langford J. W, "LOGISTICS PRINCIPLES AND APPLICATIONS", McGraw Hill, UK.

MS-225                      Total Quality Management                      2(2+0)

Theory Cr Hrs, 2

Lab Cr Hrs, 0

### Objective:

Enable the student:

To know about the importance of quality & its basic concepts

To understand the principles of TQM.

To learn the tools & techniques for quality improvements.

### Course Outline:

Quality: Introduction, quality concepts, significance of quality, Total quality, concept of TQM, Principles of TQM

Commitment and Leadership: Introduction, Commitment & policy, creating or changing the management culture, Effective leadership. Charting/Planning: Introduction, Operation, Process/Flow charting (including some advance diagrams or charts etc.), Chart symbols, Purchasing parameters, Planning for JIT

Design for quality: Introduction, Innovation, Quality function development and the house of quality Quality related costs: Prevention, Appraisal & failure costs, Models for quality costing Quality measurements: Significance, inspection planning, Gauging, Measurements Implementing TQM: TQM & Management of change, planning, The implementation of TQM, Sustained improvement

Quality Management System (ISO 9000 series): Significance, Documentation, Implementation & certification, Audits, Expected problems

Environmental Management System (ISO 14000 series): Significance, Documentation, Implementation & certification, Audits, Expected problems

### Books Recommended:

1. A.V Feigenbaum, "Total quality control"
2. Oakland J.S, "Total quality Management"
3. ISO 9000 series of standards & ISO 14000 series of standards.
4. Lucy C. Morse, Daniel L. Babcock, "Managing Engineering & Technology 4<sup>th</sup> Ed."
5. Banga & Sharma, "Industrial Organization & Management."
6. Gitlow H.S & Gitlow S.J, "Total Quality Management in action" PMusa K Ibrahim Publisher Lahore.
7. Kuhre W.L, "A Practical Guide for obtaining ISO 14000 certification"

MT-315

Production Automation

4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

**Objective:**

Enable the students to understand basics of automation & CNC machines and apply new techniques in production engineering.

**Course Outline:**

Automation: Introduction, Economics of Automation, Flow lines, Mathematical models, Storage Buffers, Partial Automation, Balancing, Group Technology and Flexible manufacturing.

Hardware of Automation:

Introduction: Building Blocks of Automation, Robotics Geometry, Kinematics, Drives and Motion Control, Uses of CNC Machines, Advantages, Machine Control, Machine Codes, Programming.

CNC Machines: General information, Operation, Control panel description, Tool function, Practical application of tool wear offset, feed function, spindle function, programming of CNC in absolute & incremental system, program-creation, preparatory function, CAD/CAM approach to part programming, CAD/CAM application (turning problem, surface milling, machining of curved surfaces.)

Programmable Logic Controllers: Introduction to PLCs, Advantages of PLCs, Ladder Logic Diagrams, Switching Logics, Components of PLC, PLC Operating Cycle, PLC Connection, PLC operation, PLC Applications.

**List of Practicals:**

1. Practice on manual Lathe machine to make & perform operation like facing, turning, drilling, threading etc.
2. Practice on manual milling machine to make & perform operation like grooving facing, milling etc.
3. Drawing & Production of parts using CAM software for CNC lathe.
4. Drawing & Production of parts using CAM software for CNC milling.
5. Introduction to programming G & M codes, CNC simulators.
6. Linear interpolation & rapid traverse.
7. Absolute vs. incremental coordinate programming.
8. Turning & facing of a stepped shaft.
9. Circular interpolation & roughing cuts with a tool change.
10. Canned cycle – Facing & Rough Turning.
11. Canned cycle – Grooving external threading.

**Recommended Books:**

1. MR Groover, "Automation, Production System, & CAM", Prentice Hall
2. C.R. Asfahl, "Robotics & Manufacturing Automation (2<sup>nd</sup> Ed.)", John Wiley
3. Bollinger & Duffie, "Computer Control of machines & Processes"
4. G.Salvendy, "Handbook of Industrial Engineering (2<sup>nd</sup> Ed.)", John Wiley

**MT-322 Renewable Energy and Environmental Technologies**  
4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

**Objective:**

Enable the students to comprehend energy resources, alternative energy resources, environmental pollution and its remedies.

**Course Outline:**

Energy Resources: Fossil fuel resources, coal, oil and gas, resources of energy, supply and demand. Alternative energy resources: Nuclear, Solar, Wind, Ocean, Tidal and geo thermal. Steam power plants: Modern steam plants, reheat and regenerative Turbines, flow through steam nozzles, Impulse and reaction turbines, pressure compounding, Velocity compounding, extraction and back pressure turbines. Boiler makeup and treatment. Gas Turbine Power Plants: Practical Gas turbine cycle. Isentropic efficiency of compressor and turbines, intercooling and reheating. Combine Cycle Power Plants: General combined cycle with heat recovery boilers.

Jet Propulsion Plant: Aircraft Jet engine, efficiency and performance of turbojet plant, ram jet, comparison of plants for subsonic and supersonic flights.

Nuclear Power Plant: Introduction, power from nuclear energy, nuclear fusion and fission, Radioactivity, Decay rates and half life, converting mass into energy by fission. Thermal-Fission Reactors and Power Plants, Pressurized water reactor (PWR), The boiling water reactor (BWR)

Environmental pollution: Introduction, Importance of environment. Scale of environmental pollution.

Atmospheric Pollution: Types of atmospheric pollution, their causes and effects on human health. Available technologies for controlling pollution.

Industrial Waste: Solid waste, effluents and waste gases produced by various industries. Available technologies for the treatment of industrial waste.

Water pollution: causes, types and its remedies

Noise pollution: Measurement of noise level. Effect of excessive noise on human health. Remedial measures.

**Books Recommended:**

1. Eastop and McConkey, "Applied Thermodynamics for Engg Technologists"
2. M. M. El-Wakil, "Power Plant Technology"

**MT-323**

**Metrology & Gauging**

**3(2+1)**

Theory Cr Hrs, 2

Lab Cr Hrs, 1

**Objective:**

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Gangadhar College of Engineering

Enable the students to understand the type and use of measuring and inspection tools in production.

### Course Outline:

Standards and Measurement Krypton 86 as Measurement Standard, Methods of Interferometry, Principle and Use of Optical Flat, Laser Beam as Measurement Standard

System of Limits and Fits, Basic Terminology, Unilateral and Bilateral Tolerance Systems, Geometrical Tolerances, Standard Tolerances, Classes of Standard Fits, Hole Based and Shaft Based Systems, Grades of Fits.

Linear Measurement, Line and End Standards, Use of Slip Gauges, Dial Indicators and Surface Plates, Vernier Calipers, Micrometers and Height Gauges, Laser Based Equipments, Comparators.

Angular Measurements: Protractors, Sine Bars, Angle Gauges, Levels, Clinometers, Autocollimators, Taper Gauges, Surface Texture

Introduction and Units, Measurement with Light Wave interference, Mechanical Methods of Measurement, Waviness and Lay, Roughness, Value and Cutoff, Surface Texture Symbols, Preferred Roughness, Average Values.

Gauges and Gauging: Introduction to Fixed Limit Gauges, Basic Terminology, Types, Gauge, Tolerance, Gauging Systems, Screw Thread and Pipe Thread Gauges, Mechanical Amplification Gauge Systems, Pneumatic Gauges, Electric and Electronic Gauges,

Coordinate Measuring Machines: Introduction, Working Principles, Types, Applications, Advantages, Economic Consideration,

### List of Practical's:

1. Familiarization with the use of vernier calipers, inside and outside micrometers, height gauges, dial indicators and surface plates.
2. Calibration of vernier calipers, micrometers, height gauges and dial indicators with the help of slip gauges.
3. Familiarization with various types of comparators.
4. To practice the use of comparators.
5. To learn and practice the use of angle measuring devices (Protractors, sine bars, angle gauges, levels, clinometers and taper gauges).
6. To inspect the surface texture of given specimens using Auto Collimators.
7. Familiarization with the function of an interferometer and Inspect the given specimen with the help of interferometry.
8. To inspect the surface texture of given specimens using optical flats.
9. Familiarization with various types of fixed limit gauges and to learn their use
10. To inspect different types of threads with the help of thread gauges.
11. To learn the use of various types of electric and electronic gauges.
12. To learn the use of various types of pneumatic gauges.
13. Familiarization with the parts and working of a Coordinate Measurement Machine.
14. To measure three-dimensional non-regular profiles of the given specimens and to define the profile characteristics.
15. Familiarization with the parts and use of toolmaker's microscope.
16. To prepare sketches of small parts with the help of toolmaker's microscope.

**Recommended Books:-**

1. Hume K.J, "ENGINEERING METROLOGY", Macdonald and Company, London,
2. Galyer J and Shotbolt C, "METROLOGY FOR ENGINEERS", Cassell Ltd, London,
3. Morris A, "MEASUREMENT AND CALIBERATION FOR QUALITY ASSURANCE", Prentice Hall, UK

MT-324 Refrigeration and Air Conditioning 4(3+1)

Theory Cr Hrs, 3

Lab Cr Hrs, 1

**Objective:**

Enable the student to be familiar with the mechanism of refrigeration & air conditioning and also make estimates of load of refrigeration or air conditioning

**Course Outline:**

List of Practicals Refrigeration and Heat pump Cycles: Properties of refrigerants and brine. Carnot and Joule reverse cycles, Vapour-compression and vapour absorption cycles, Coefficient of performance, Efficiencies. Refrigeration Machines: Cold air, vapour-compression, Steam-jet and absorption types Heat pumps, Domestic type, Auxiliaries and controls. Application of Refrigeration: Cold storage, Ice-making, Dairying, Quick freezing air-conditioning, Layouts, Load calculation and performance. Air-conditioning and Ventilation: Use of the psychrometric charts, Calculation of heat to be removed by an air-conditioning plant, Air-conditioning requirements for comfort and industrial processes. Air conditioning equipments: window type, split type, package type, cooling towers, air washers, chillers, duct layout.

**List of Practical's:**

1. Find the C.O.P. of refrigerator.
2. Effect of condensing temperature on the performance of a refrigerator.
3. Efficiency of a refrigerator
4. Construction of pressure enthalpy diagram for vapor compression system refrigeration and its performance measurement.
5. To check the performance of a vapor compression system refrigerator by varying the heat input to the evaporator.
6. Representation of Properties of air on Psychometric charts
7. Air conditioning cycle on charts.
8. Demonstration of domestic refrigerator
9. Demonstration of cooling tower
10. Demonstration of window type air conditioner
11. Demonstration of chiller AC plant.

**Recommended Books:**

1. R. J. Dosset, "Principles of Refrigeration"
2. Jordan and Priester, "Refrigeration and Air Conditioning"

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## 3. W.F. Stocker, "Refrigeration and Air Conditioning"

MS-326                      Project Management                      3(3+0)

Theory Cr Hrs, 2  
Lab Cr Hrs, 0

**Objective:**

Enable the students to develop Managerial skills, get acquainted with the principles of management & human relations

**Course Outline:****Management**

Industrial Management: Introduction, Management as science or art, history of management, management functions Organization: Introduction, organizational structure, types, their advantages & disadvantages Foremanship & leadership: Introduction, duties of foreman, essential qualifications of a foreman, types of leaders, acceptance of administration, leadership, qualities of leadership Inventory control: Introduction, types of inventory, Need of inventory control, The maximum stores, minimum stores, The standard order, The ordering point, lead & procurement time, Economic ordering quantity (EOQ), Use of computer Production: Introduction, method of production, advantages & disadvantages, planning & scheduling, introduction to CPM & PERT Inspection: Definition, objectives, function of inspection dept., qualities of inspector, major principles, standard of inspection, kind of inspection, advantages & disadvantages Human Resource Management: Management styles, psychological types, recruitment and training, job evaluation, performance appraisal, motivation and incentives.

**Recommended Books:**

1. Babcock D.L, "Managing Engineering & Tech" Prentice UK
2. Banga & Sharma, "Industrial Management"

MT-222                      Industrial and Environmental Safety                      2(2+0)

Theory Cr Hrs, 2  
Lab Cr Hrs, 0

**Objective:**

Enable the students to know and apply safety standards rules etc in industry in preventing accidents etc.

**Course Outline:**

Classification of Health hazards: Physical, chemical, biological  
Sources of risk: Machinery Noise, Electrical failure, ventilation, lighting, radiation  
Department of Technical Education, BS Mechanical Engineering Technology, Fall 2018

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Principal  
University College of  
Engineering & Techno  
University of Jammu

Dangerous substances: Classification, Entry & Exit routes, safe handling, Health & safety, regulation & policy

Safety Machining & Guarding: Preventing Machining accidents, Machine guarding Equipment & Machine handling: Mechanical & Manual Handling, Access equipment, Transport, Electricity & Electrical Equipment. Fire: Classification, fire protection, means of Escape, Actions to be taken. Chemical safety Personal protection

Safety Management: Accident prevention, health & safety training, communicating safety measures

### Recommended Books:

1. Holt A.S.J, "Principle of Health & safety at work", The institution of occupational safety & health. The caverdisk press Limited. UK 1999
2. Patty F.A, "Industrial Hygiene & Toxicology Vol-1 General Principles", Inter science Publishers New York.

MT-421                      Supervised Industrial Training                      32(0+32)

Theory Cr Hrs, 0  
Lab Cr Hrs, 32

### Guidelines:

The students shall undergo Supervised Industrial Training (minimum duration of 32 Credit Hours) The students are required to submit monthly Progress Report to the institute duly verified by their Industrial supervisor.

The institute is responsible to contact with all industrial supervisors to check the student's performance At the end of the training, the students are required to submit a detailed report to the institute and undergo viva-voce examinations

*Yasin*  
Principal  
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Engineering & Technol  
University of Sargodha