

## Semester- II

### 1. Engineering Mathematics-II (BSH 105)

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>2</b>	<b>1</b>
<b>Contact Hours</b>	<b>2</b>	<b>2</b>

**Theory:** Matrices: Elementary transformations, rank of a matrix, reduction to normal form, Gauss-Jordan method to find inverse of a matrix, consistency and solution of linear equations, Eigen values and Eigen vectors, Cayley-Hamilton theorem, linear transformation, orthogonal transformations, diagonalisation of matrices, Bilinear and quadratic forms. Functions of a Complex variable: Limit, continuity and derivative of complex functions, analytic function, Cauchy-Reimann equations, conjugate functions, Harmonic functions. Fourier series: Infinite series and its convergence, periodic functions, Fourier series, Euler's formulae, Dirichlet's conditions, functions having arbitrary period, even and odd functions, half range series, 184 Harmonic analysis. Partial differential equations: Formation of partial differential equations, Lagrange's linear equation, Higher order linear partial differential equations with constant coefficients, solution of non-linear partial differential equations, Charpit's method, application of partial differential equations (one dimensional wave and heat flow equations, two dimensional steady state heat flow equation (Laplace equation)).

## 2. Computer Programming & Data Structures (PFE 102)

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>1</b>	<b>2</b>
<b>Contact Hours</b>	<b>1</b>	<b>4</b>

**Theory:** Introduction to high level languages, Primary data types and user defined data types, Variables, typecasting, Operators, Building and evaluating expressions, Standard library functions, Managing input and output, Decision making, Branching, Looping, Arrays, Users defined functions, passing arguments and returning values, recursion, scope and visibility of a variable, String functions, Structures and union, Pointers, Stacks, Push/Pop operations, Queues, Insertion and deletion operations, Linked lists.

### **Practical:**

Familiarizing with Turbo C IDE; Building an executable version of C program; Debugging a C program; Developing and executing simple programs; Creating programs using decision making statements such as if, go to & switch; Developing program using loop statements while, do & for; Using nested control structures; Familiarizing with one and two dimensional arrays; Using string functions; Developing structures an union; Creating user defined functions; Using local, global & external variables; Using pointers; Implementing Stacks; Implementing push/pop functions; Creating queues; Developing linked in C language; Insertion/ Deletion in data structures.

### 3. Applied Electronics and Instrumentation (PFE 103)

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>2</b>	<b>1</b>
<b>Contact Hours</b>	<b>2</b>	<b>2</b>

**Theory:** Semiconductors, p-n junction, V-I characteristics of p-n junction, diode as a circuit element, rectifier, clipper, clamper, voltage multiplier, capacitive filter, diode circuits for OR & AND (both positive and negative logic), bipolar junction transistor: operating point, classification(A,B & C) of amplifier, various biasing methods (fixed, self, potential divider), h-parameter model of a transistor, analysis of small signal, CE amplifier, phase shift oscillator, analysis of differential amplifier using transistor, ideal OP-AMP characteristics, linear and non-linear applications of OP-AMP (adder, subtractor, integrator, active rectifier, comparator, differentiator, differential, instrumentation amplifier and oscillator), zener diode voltage regulator, transistor series regulator, current limiting, OP-AMP voltage regulators, Basic theorem of Boolean algebra, Combinational logic circuits(basic gates, SOP rule and Kmap), binary ladder D/A converter, successive approximation A/D converter, generalized instrumentation, measurement of displacement, temperature, velocity, force and pressure using potentiometer, resistance thermometer, thermocouples, bourden tube, LVDT, strain gauge and tacho-generator.

**Practical:** To study V-I characteristics of p-n junction diode; To study half wave, full wave and bridge rectifier; To study transistor characteristics in CE configurations; To design and study fixed and self bias transistor; To design and study potential divider bias transistor; To study a diode as clipper and clamper; To study a OP-AMP IC 741 as inverting and noninverting amplifier; To study a OP-AMP IC 741 as differentiator amplifier; To study a differential amplifier using two transistor; To study a OP-AMP IC 741 as differential amplifier; To study a zener regulator circuit; To study a OP-AMP IC 741 as a active rectifier; To study a OP-AMP IC 741 as a comparator; To familiarize with various types of transducers.

#### 4. Surveying and Leveling (SWE 102)

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>1</b>	<b>2</b>
<b>Contact Hours</b>	<b>1</b>	<b>4</b>

**Theory:** Surveying: Introduction, classification and basic principles, Linear measurements. Chainsurveying. Compass survey. Errors in measurements, their elimination and correction. Plane table surveying. Levelling, Contouring, Computation of area and volume. Theodolite traversing. Introduction to setting of curves.

**Practical:** Chain survey of an area and preparation of map; Compass survey of an area and plotting of compass survey; Plane table surveying; Leveling. L-section and X-sections and its plotting; Contour survey of an area and preparation of contour map; Introduction of software in drawing contour; Theodolite surveying; Ranging by theodolite, Height of object by using theodolite; Setting out curves by theodolite; Minor instruments.

**5. Workshop Technology-II (FPM 102)**

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>0</b>	<b>+ 2</b>
<b>Contact Hours</b>	<b>0</b>	<b>+ 4</b>

**Practical:** Jobs on arc welding- Lap joint, Butt joint; T-Joint; Gas welding Practice – Lap, Butt and T-Joints. Mould making using one-piece pattern and two pieces pattern. Demonstration on Processes in machining and use of measuring instruments. Practical jobs on simple turning, step turning and taper turning, Drilling and threading. Operations on shaper, changing a round MS rod into square section on a shaper. Demonstration of important operations on a milling machine, making a plot, gear tooth forming and indexing.

## 6. Thermodynamics and Heat Engines (FPM 103)

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>2</b>	<b>1</b>
<b>Contact Hours</b>	<b>2</b>	<b>2</b>

**Theory:** Thermodynamics properties, closed and open system, flow and non-flow processes, gas laws, laws of thermodynamics, internal energy. Application of first law in heating and expansion of gases in non-flow processes. First law applied to steady flow processes. Kelvin-Planck and Clausius statements. Reversible processes, Carnot cycle, Carnot theorem. Entropy, physical concept of entropy, change of entropy of gases in thermodynamics processes. Difference between gas and vapour, change of phase during constant pressure process. Generation of steam, triple point and critical point. Internal energy and entropy of steam. Use of steamtables and Mollier chart, heating and expansion of vapour in non-flow processes, measurement of dryness fraction. Classification of steam boilers, Cochran, Lancashire, locomotive and Babcock-Wilcox boilers. Boiler mountings and accessories. Desirable properties of working fluid used for power plants. Rankine cycle. Expansive and non expansive working. Saturation curve and missing quantity, governing. Calculations of cylinder dimensions, Introduction to compound steam engines. Air Standard efficiency, other engine efficiencies and terms. Otto, diesel and dual cycles. Calculation of efficiency, mean effective pressure and their comparison. Measurement of IP, BP and heat balance calculations (not involving combustion). Engine efficiencies and performance.

**Practical:** Study of boilers; Study of various mountings and accessories of boilers; Study of steam engine; To measure dryness fraction of steam; Performance test of steam engine; Study of I.C. engines; Study of valve timing diagram of 2-stroke engines; Study of valve timing diagram of 4-stroke engines; Performance test on 2- cylinder diesel engines; Performance test and heat balance test on a four cylinder horizontal diesel engine; Practical test; To conduct Morse test on multi-cylinder petrol engine; Comparison of different temperature measuring methods; To verify inverse square law of radiation; To verify Stefan-Boltzman relationship; To determine the emissivity of a given material.

## 7. Agricultural Science-II (AGS 102)

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>2</b>	<b>1</b>
<b>Contact Hours</b>	<b>2</b>	<b>2</b>

**Theory-Horticulture:** Scope of Horticultural crops. Important commercial fruit crops-area, distribution and economic value. Soil and climate requirements for fruits, vegetables and floriculture crops. Improved varieties, criteria for site selection, layout and planting methods, nursery raising, macro and micro propagation methods, plant growing structures, pruning & training, fertilizer application, fertigation, irrigation methods, harvesting, grading and packaging, post harvest practices, Garden tools, management of Orchard, Extraction and storage of vegetables seeds. Budding and grafting- classification and description. Quality standard for export of horticultural and animal science product

**Animal Science:** Livestock- Terminology, Breeds, population and distribution, (in respect of N.E. Region) feed and fodders, housing requirements, economy of farming.

Distribution of Indian major carps (IMC) and their production in the N. E. Region – preparation of ponds (for culture) – spawning, fingerling, rearing, economic value and proper marketing.

**Practical-Horticulture:** Identification and description of important fruits, flowers and vegetables crops; study of different garden tools. Preparation of nursery bed; Practices of pruning and training in some important fruit crops; Practices of budding and grafting on different fruits and flower plants, practice in harvesting, handling and packaging of different cut flowers. Practice in harvesting, handling, grading and packaging of important horticultural product. Preservation and value addition of Horticultural crops.

**Animal Science:** Fish culture, preservation and value addition in fisheries, Physical and Physiological parameters of domestic animals, their feeding schedules, handling and casting of cattle's

## 8. Engineering Mechanics (SWE 103)

	<b>L</b>	<b>P</b>
<b>Credits</b>	<b>2</b>	<b>+ 1</b>
<b>Contact Hours</b>	<b>2</b>	<b>+ 2</b>

**Theory:** Basic concepts. Force systems. Centroid. Moment of inertia. Free body diagram and equilibrium of forces. Frictional forces. Analysis of simple framed structures using methods of joints, methods of sections and graphical method. Simple stresses. Shear force and bending moment diagrams. Stresses in beams. Torsion. Analysis of plane and complex stresses.

**Practical:** Problems on; Composition and resolution of forces, moments of a force, couples, transmission of a couple, resolution of a force into a force & a couple; Problems relating to resultant of; a concurrent - coplaner force system, nonconcurrent - coplaner force system, nonconcurrent - noncoplaner force system, parallel - noncoplaner force system, system of couples in space; Problems relating to centroids of composite areas; Problems on moment of inertia, polar moment of inertia, radius of gyration, polar radius of gyration of composite areas; Equilibrium of concurrent – coplaner and nonconcurrent – coplaner force systems; Problems involving frictional forces; Analysis of simple trusses by method of joints and method of sections; Analysis of simple trusses by graphical method; Problems relating to simple stresses and strains; Problems on shear force and bending moment diagrams; Problems relating to stresses in beams; Problems on torsion of shafts; Analysis of plane and complex stresses.