# B TECH in INDUSTRIAL AND PRODUCTION ENGINEERING

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|      |                |           |                                             | 30 |    |   |   |           |                                             | 27 + 3 = 30 |

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|      |                |           |                                             | 15 + 3 = 18 |   |   |   |           |                                             |   |
Minor Specializations
I. Industrial Management
MME 4053: Organisational Behaviour
MME 4054: Personnel Management an Industrial Relations
MME 4055: Project Management
MME 4056: Technology Management

II. Manufacturing
MME 4045: Composite Materials
MME 4046: Heat Treatment of Metals and alloys
MME 4057: Industrial Robotics
MME 4047: Lean Manufacturing

III. Material Science
PHY 4051: Physics of Low Dimensional Materials
PHY 4052: Physics of Photonic & Energy Storage Devices
CHM 4051: Chemical Bonding
CHM 4052: Chemistry of Carbon Compound

IV. Business Management
HUM 4051: Financial Management
HUM 4052: Human Resource Management
HUM 4053: Marketing Management
HUM 4054: Operation Management

V. Computational Mathematics
MAT 4051: Applied Statistics and Time Series Analysis
MAT 4052: Computational Linear Algebra
MAT 4053: Computational Probability and Design of Experiments
MAT 4054: Graphs and Matrices

Programme Electives
MME 4062: Automobile Engineering
MME 4089: Business Process Re-Engineering
MME 4065: Corrosion Science and Engineering
MME 4058: Database Management systems
MME 4041: Design for Manufacture and Assembly
MME 4090: Design of Experiments
MME 4042: Design of Mechanical Systems
MME 4066: Elements of Mechatronics Systems
MME 4059: Enterprise Resource Planning
MME 4060: Ergonomics
MME 4091: Finite Element Methods
MME 4072: Machine Tool Technology
MME 4061: Management Information systems
MME 4074: Materials Characterization
MME 4092: Materials Management
MME 4075: MEMS and Nano Technology
MME 4076: Micromachining
MME 4079: Non Destructive Testing
MME 4078: Non-conventional energy resources
MME 4082: Plant Engineering and Maintenance
MME 4093: Rapid Prototyping
MME 4094: Theory of Metal Forming

Open Electives
MME 4305: Introduction to Operations Research
MME 4306: Introduction to Quality Control
MAT 2151: ENGINEERING MATHEMATICS III [2 1 0 3]

References:

MME 2156: FACILITIES PLANNING AND DESIGN [3 0 0 3]
Introduction to Location, Factors influencing plant location, Qualitative methods of location:- Quantitative methods of location, Plant Layout-Objectives, principles, different type of layouts, Problems on layouts. Material Handling-Scope, Importance and advantages of material handling (MH), principles of material handling, Packaging, types of material handling equipment, Factors influencing facility design, Planning the layout-Layout fundamentals, scientific approach, line balancing: meaning, Drawings and models, Templates evaluation of layout, installation of layout, Single facility and multi facility location models, warehouse layout models, Design of layout using Travel chart, Sequence demand straight-line method and non - directional method, Conveyor and Storage models, Computer Aided layouts.

References:

MME 2157: MANUFACTURING PROCESS ENGINEERING [4 0 0 4]

References:

MME 2158: METROLOGY AND MEASUREMENTS [3 0 0 3]

References:

MME 2159: SCIENCE AND MECHANICS OF MATERIAL [3 1 0 4]
Crystal structures of materials, packing factor, co-ordination number, Miller indices, crystal imperfections. Degree of super cooling, nucleation, mechanism of solidification. Phases, Gibb's phase rule, solid solutions and types, Intermediate phases, equilibrium diagrams, equilibrium and non-equilibrium cooling, invariant reactions, Lever rule and its application, equilibrium and non-equilibrium cooling of an alloy and congruent melting alloy phase. Iron carbon diagrams, cooling curve for pure iron, Fe-C equilibrium diagrams, study of iron-carbon system in detail with emphasis on the invariant reactions. Tensile, compressive and shear deformation of simple and compound bars under axial load, thermal stress, strain energy, stress strain diagrams for ductile and brittle materials. Shear force and bending moment in cantilever and simply supported beams, stresses in beams, theory of simple bending, shear stresses in beams, evaluation of beam deflection and slope. Torsion of solid and hollow shafts. Principal stresses, Mohr's circle method, analysis of stresses in thick and thin cylinders.

References:
References:

MME 2174: MATERIAL TESTING LAB [0 0 3 1]
To carry out the tension test on mild steel specimen, hardness tests on metals by using Vickers, Brinnell and Rockwell hardness testers, impact tests on metals by Charpy and Izod methods, torsion test on mild steel, test on leaf spring, helical spring, bending test and fatigue testing on mild steel, test to find out external flaw using dye penetrant test, understanding the heat treatment processes on steel like annealing, normalizing, hardening and the tempering, microstructure study of metals and estimation of sliding wear properties of a given specimen.

References:

MAT 2259: ENGINEERING MATHEMATICS IV [2 1 0 3]
Measures of central tendency, measures of dispersion, mean, median, mode, standard deviation, correlation coefficient Introduction to probability, finite sample space, conditional probability and independence, Bayes' theorem, one dimensional random variable: mean and variance, Chebyshev's inequality. Two and higher dimensional random variables, covariance, correlation coefficient, regression, least square principle of curve fitting. Distributions: binomial, Poisson, uniform, normal, gamma, chi-square and exponential. Moment generating function, Functions of one dimensional and two dimensional random variables, Sampling theory, Central limit theorem and applications.

References:

MME 2255: FLUID MECHANICS AND MACHINERY [3 1 0 4]
Fluid properties, ideal and real fluids, Fluid statics, Pascal's law, Hydrostatic law, pressure measurement by manometers. Total pressure and center of pressure for plane surfaces submerged in liquids, buoyancy, stability conditions for floating and submerged bodies, metacenter and metacentric height, fluid kinematics, continuity equation, Fluid dynamics, Euler's equation, Bernoulli's equation, Linear momentum equation, flow measurement by venturimeter, orifice meter, notches, viscous flow through the circular pipe and between two parallel plates, turbulent flow, major and minor losses, dimensional analysis, similitude, Forces on plane, inclined and curved surfaces. Principle of operation of hydraulic turbines, pumps, gear pump, vane and reciprocating pump.

References:
MME 2256: MANUFACTURING AUTOMATION ENGINEERING [3 1 0 4]


References:

MME 2257: THEORY OF MACHINES [3 1 0 4]

Mechanisms and Machine, slider crank and four bar mechanisms, inversions, types of mechanisms. Velocity and acceleration of mechanisms, Relative velocity and instantaneous centre method, Relative acceleration method. Types of Cams and followers, Cam profiles, Balancing of rotating masses in single and different planes. Spur, helical and bevel gear terminology, minimum number of teeth to avoid interference. Types of Gear trains, torque calculations. Belt tensions, power transmitted by a flat and rope belt drive, no. of ropes required. Vibrations - longitudinal, transverse, torsional vibration. Displacement, velocity and acceleration, undamped free vibration of spring-mass system.

References:

MME 2258: WORK SYSTEMS ENGINEERING [3 0 0 3]

Productivity in the individual enterprise. Total time of a job, Factors tending to reduce productivity, Techniques for reducing excess work content and ineffective time, Basic procedure of Work study, Basic procedure of Method study, Outline process chart, Flow process charts, Flow diagram, The questioning technique, Multiple activity chart, Travel chart, String diagram, The principles of motion economy, Two handed process chart, Micromotion study, Therbligs, SIMO chart, Work measurement, Time study, Types of elements, Methods of timing the elements, Methods of rating, Standard time determination, Work sampling, Predetermined time standards, Standard Data. Restricted work, Pump diagram, Ergonomics, Anthropometry, Working environment.

References:

MME 2274: METROLOGY LAB [0 0 3 1]

Study of measuring instruments and gauges. Screw thread measurements, Measurement of effective diameter of external screw threads, Use of Comparators, Measurement of gear dimensions, Radius and angle measurement, Calibration of Micrometer and Vernier caliper, Surface texture and straightness measurement, Use of Profile projector, Coordinate Measuring Machine and Interferometer.

References:

MME 2273: THERMO-FLUID LAB [0 0 3 1]


References:

MME 2272: WORKSHOP PRACTICE - II [0 0 3 1]

Exercises on spur gear and helical gear cutting using milling & gear hobbing machines. Practice of shaping operations, Exercises on grinding operations. Machining using CNC Vertical Machining Center and use of Non-conventional machines.

References:
**FIFTH SEMESTER**

**HUM 3151: ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT [2 1 0 3]**


**Reference Books:**

**MME 3155: DESIGN OF MACHINE ELEMENTS [3 1 0 4]**

Materials and their properties, principal stresses, theories of failure, factor of safety, strength under combined axial, bending & torsional loads, stress concentration. Fatigue: S-N diagram, Low cycle and high cycle fatigue, variables affecting fatigue strength, Goodman & Soderberg equations, stresses due to combined loading. Design of shafts subjected to bending in two planes in addition to axial loads. Stress in keys, Stresses in bolts, Stresses in power screw, Efficiency of power screw, Force & torque requirement to lift load in power screw jack. Helical coil springs, spring materials, Stress & deflection of springs subjected to steady, fluctuating & impact loads, Energy stored in springs, Critical frequency, Concentric springs. Spur and Helical gears design for static, dynamic and wear load. Selection of Journal bearings and Rolling contact bearing.

**References:**

**MME 3156: OPERATIONS RESEARCH [3 1 0 4]**

The subject covers definition, phases, applications, advantages and disadvantages of operations research. Linear programming problems (LPP) are formulated and solved using graphical and simplex methods and Post optimality analysis conducted. The special cases of LPP include Transportation and assignment problems along with travelling salesman problem. Dynamic programming, Game theory and various methods, waiting line models and simulation. Network model analysis using Critical path method and Project evaluation and review technique.

**Reference Books:**

**MME 3157: SIMULATION MODELING AND ANALYSIS [3 0 0 3]**


**References:**

**MME 3158: TOTAL QUALITY MANAGEMENT [3 1 0 4]**

Definition of quality and Total quality management(TQM), Basic concepts of TQM, Contributions of Gurus of TQM, Characteristics of successful quality leaders, The Deming philosophy, Quality statements, Strategic
References:

MME 3173: AUTOMATION ENGINEERING LAB [0 0 3 1]
Pneumatics circuit design using Single acting cylinder, Double acting cylinder, Quick exhaust valve, Shuttle valve, Time delay valve, Dual pressure valve, Pressure sequence valve, Pneumatic Counter, Multiple cylinders, Single solenoid & double solenoid 5/2 valve, Electrical latching, Pressure to electric converter, ON delay timers, Proximity sensors, Electrical counter, Pneumatic circuit using PLC, Hydraulic circuit design using Variable displacement pump, Throttle check valve, Pilot operated check valve, Pressure reducing valve, Pressure switch, Hydraulic Accumulator, 4/3 Direction control valve, Inductive sensor and Hydraulic motor.

References:

MME 3174: OPERATIONS RESEARCH LAB [0 0 3 1]
Formulating and solving real-world problems into a linear problem with suitable assumption, objective functions and constraints using graphical, Simplex method, transportation and assignment method and conducting sensitivity analysis. Solving problems related to game theory, waiting line models, network analysis and dynamic programming. Modeling a linear and non-linear optimization problem and constraints into a simulation model using the Monte Carlo Simulation Technique.

Reference Books:

MME 3175: WORK SYSTEMS ENGINEERING LAB [0 0 3 1]
Construction of Outline Process Chart, Flow process chart and Flow diagram, Two handed process chart, Multiple activity chart (Man-Machine chart), Performance rating exercises, Basic time determination for the given task, Determination of Standard time using Stop watch time study, Development of Standard data, Determination of Standard time for simple operation using Work study software, Construction of SIMO chart, Estimating Standard time using Predetermine Time Standards (PTS), Measurement of physical work using Walking simulator and Ergometer.

References:

HUM 3152: ESSENTIALS OF MANAGEMENT [2 1 0 3]

References:

MME 3253: OPERATIONS AND SUPPLY CHAIN MANAGEMENT [3 1 0 4]
Introduction to operations supply chain management, Types of production systems, Production consumption cycle, Functions of production and operations management, supply chain decisions, types of supply chains, supply chain metrics, logistics, bullwhip effect,
Forecasting, Qualitative methods of forecasting, Quantitative methods of forecasting, Forecast control, Pure and mixed strategies of aggregate planning, Aggregate planning using trial and error approach, Materials Requirement planning, Job shop scheduling Factors affecting job shop scheduling, Index method, Priority sequencing rules, Classification of inventories, Economic order quantity, Inventory control models, The role of facility decisions in supply chain, factors influencing network design in supply chain, Role of transportation in a supply chain, factors affecting transportation decisions, modes of transportation and their performance characteristics, Routing and scheduling in transportation, The impact of financial factors on supply chain decisions.

References:

MME 3254: TOOL ENGINEERING AND DESIGN [3 1 0 4]

References:

MME 3273: OPERATIONS MANAGEMENT LAB [0 0 3 1]

References:

MME 3274: QUALITY ENGINEERING LAB [0 0 3 1]
To test the Goodness of fit for the given quality characteristic using Binomial, Poisson Normal and Uniform distributions, Construction of Repeatability and Reproducibility studies for the given measurement system, Construction of control charts for variables (X, R and s charts) and attributes (p, np, c and u charts), Assessing the Process capability of the given manufacturing process, Construction of Operating characteristic curve for the given acceptance sampling plan, Graphical and pictorial representation of data, Construction of control charts for variables and attributes using statistical software.

References:

MME 3275: SIMULATION MODELING AND ANALYSIS LAB [0 0 3 1]
Introduction to Simulation Packages and selection, Identifying probability distributions for given data, Building simulation models for manufacturing operations and service operations, Statistical Analysis of Simulation models (input and output analysis).

References:

SEVENTH SEMESTER
There are five program electives and one open elective with total of 18 credits to be taught in this semester.

EIGHTH SEMESTER

MME 4298: INDUSTRIAL TRAINING
Each student has to undergo industrial training for a minimum period of 4 weeks. This may be taken in a phased manner during the vacation starting from the end of third semester. Student has to submit to the department a training report in the prescribed format and also make a presentation of the same. The report should include the certificates issued by the industry.
MME 4299: PROJECT WORK/ PRACTICE SCHOOL
The project work may be carried out in the institution/industry/ research laboratory or any other competent institutions. The duration of the project work shall be a minimum of 16 weeks which may be extended up to 24 weeks. A mid-semester evaluation of the project work shall be done after about 8 weeks. An interim project report on the progress of the work shall be submitted to the department during the mid-semester evaluation. The final evaluation and viva-voice will be conducted after submission of the final project report in the prescribed form. Student has to make a presentation on the work carried out, before the department committee as part of project evaluation.

PROGRAM ELECTIVES

MME 4053: ORGANIZATIONAL BEHAVIOR [3 0 0 3]

References:

MME 4054: PERSONNEL MANAGEMENT AND INDUSTRIAL RELATIONS [3 0 0 3]

References:

MME 4055: PROJECT MANAGEMENT [3 0 0 3]
Concept of project, Project life cycle, organizing projects within the functional organization, organizing projects as dedicated teams, organizing projects within a matrix arrangement, Project manager and their attributes. Feasibility study, Pre-feasibility study, Steps of feasibility study, Estimating project times and costs, Factors influencing the quality of estimates, Top-down approaches of estimation, Bottom-up approaches of estimation, Hybrid approach of estimation. Risk management process, Risk Assessment - probability analysis, Contingency planning, Contingency funding and time buffers, Risk response control, Project scheduling, Bar charts and Milestone charts, Development of networks, Work Breakdown Structure, Program Evaluation and Review Technique, Project audit and closure, Audit reporting, Evaluation of project team and members.

References:

MME 4056: TECHNOLOGY MANAGEMENT [3 0 0 3]
Management of technology, integrated and holistic model, Innovation and Competition, Timing and innovation, technology and competition, Entrepreneurs and innovation, role of the entrepreneurs, new ventures in corporation, High tech new ventures, the business plan, using the business plan to achieve goals, a business plan that sells, successful corporation, High tech new ventures, the business plan, using the business plan to achieve goals, a business plan that sells, successful product innovation, sources of venture capital. Dynamics of new firms, corporate systems, The science base of the innovation process, Micro level -the corporate innovation process, Form of technology change, the linear portion of the technology S-curve, mature and obsolete industries, innovation and market saturation, managing technology life cycles, economic long cycles, Kondratieff waves, the long wave process, the long wave hypothesis. Sources of innovation, market pull and technology push, technology maps, marketing flexibility, market positioning, sources of radical innovation, marketing experimentation in new technology. Project strategy, R&D projects.

References:
References:

MME 4046: HEAT TREATMENT OF METALS AND ALLOYS [3 0 0 3]

References:
MME 4062: AUTOMOBILE ENGINEERING [3 O 0 3]

References:

MME 4089: BUSINESS PROCESS RE-ENGINEERING [3 O 0 3]
Introduction to business processes, common business process in organisations, role of leader and manager, breakthrough reengineering, BPR and performance improvement, key targets of BPR, business process redesign & improvement, Just-in-time, collaborative manufacturing, intelligence manufacturing, product planning, product design and development, Introduction to BPR, History of BPR, BPR in manufacturing industry, Benefits of BPR, BPR and information technology, BPR implementation methodology, success factors of BPR, barriers of BPR, frame work for barrier management, BPR and relevant technologies.

References:

MME 4058: DATABASE MANAGEMENT SYSTEMS [3 O 0 3]
Definition of database and its characteristics, users of database, advantages and implications of database approach, Data models, schemas and instances, DBMS architecture and data independence, database languages and interfaces, database system environment, classification of data base management systems, Benefits of data modelling, Types of database models, Phases of database modelling, The entity-relationship model, Entity types, entity sets, attributes, and keys, relationships, relationship types, roles, and structural constraints, weak entity types, ER diagrams and design issues, relational model concepts, constraints, and schemas, update operation on relations, basic and additional relational algebra operations, and queries in relational algebra, structured Query Language (SQL): data definition etc. in SQL2, basic and complex queries in SQL, insert, delete, update statements, and views in SQL, embedded SQL, secondary storage devices, buffering of blocks, placing file records on disk, operations on files, heap files and sorted files, hashing techniques, primary, secondary and multilevel ordered indices, dynamic multi-level indices using B-trees and B+ trees, design guidelines for relational schemas, functional
Dependencies, normalization - 1st, 2nd, 3rd, 4th and 5th normal forms, importance of normalization, limitations of normal forms.

References:

MME 4041: DESIGN FOR MANUFACTURE AND ASSEMBLY [3 0 0 3]
Morphology of design, different phases, overview of product design, advantages of using DFMA, principles of DFMA in mechanical design, selection of materials and processes. Design guidelines for sand casting, investment casting, metal extrusion, stamping, fine blanked parts, rolled formed section, forging process, machining processes, heat treatment, die casting, injection moulding, sheet metal process, powder metallurgy process, joining processes. Advantages and disadvantages of 3D printing, design guidelines for 3D printing and different assembly techniques, importance of fits, tolerance and surface finish in design, production drawings.

References:

MME 4090: DESIGN OF EXPERIMENTS [3 0 0 3]

Reference Books:
1. D.C. Montgomery, Design and Analysis of Experiments (5e), Wiley India, 2008.
3. Robert H. Lochner, Joseph E. Matar, Designing for Quality - An Introduction Best of
taguchi and Western Methods or Statistical Experimental Design, Chapman and Hall, 1990.

MME 4042: DESIGN OF MECHANICAL SYSTEMS [3 0 0 3]
Introduction to Mechanical design process, Design factors. Design of Piston, Connecting rod, Crankshaft-Overhung & Center type, Valve gear mechanism, Flange coupling, Screw jack, Single plate clutch, Two speed gear box, Passenger lift, Concrete mixer, Automobile chassis & suspension. Optimization in design - Johnson's method of optimization, bar, spring, shaft.

References:

MME 4066: ELEMENTS OF MECHATRONICS SYSTEMS [3 0 0 3]

References:

MME 4059: ENTERPRISE RESOURCE PLANNING [3 0 0 3]
Introduction to ERP ERP and related technologies, integrated management information, business modelling, integrated data model. Executive information system, data warehousing, data mining, online analytical processing, A manufacturing perspective of ERR CAD/CAM, Materials requirement planning, bill of materials, closed loop MRR Manufacturing resource planning, distribution requirements planning, ERP modules, Benefits of ERR ERP implementation life cycle, implementation team training, testing, end user training, Vendors, consultants and users, Future directions in ERR faster implementation methodologies, business models, ERP case studies.

References:


**MME 4060: ERGONOMICS [3 0 0 3]**
Definitions of Ergonomics, Role of human factors engineer, Types of systems, Elements of man-machine system, System approach to human engineering, Information input and processing, Information theory, Sources and pathways of stimuli, Human sensorimotor system, Biases in decision making, Visual Displays, Quantitative and qualitative displays, Auditory displays, Biomechanics of motion, Functions of controls, Factors influencing design of control, Design of hand and foot controls, Use of Anthropometric data, Work surface, Location of component and general work place arrangement, Industrial fatigue, Causes and elimination of fatigue, Productivity and its improvement, Worker and working environment, Effect of light, colour, noise and vibration on performance.

**References:**

**MME 4091: FINITE ELEMENT METHODS [3 0 0 3]**
Review of matrix algebra, Eigen value problem, Gauss quadrature integration, Displacement and potential energy of a 3D Elastic Body, Minimum potential energy principle, Rayleigh-Ritz and Galerkin's methods, definitions and terminologies in finite element method (FEM), displacement polynomial function, Pascal's triangle, Shape functions for linear and higher order quadrilateral (Lagrange and Serendipity) and triangular elements; finite element formulation of 1D (bar element) structural problem by direct stiffness method and Galerkin's approach, Elimination and Penalty methods of handling boundary conditions; finite element formulation of 1D (bar, truss and beam elements), 2D (triangular, quadrilateral elements) and 3D (tetrahedral and hexahedral elements) structural problems by isoparametric approach.

**References:**

**MME 4072: MACHINE TOOL TECHNOLOGY [3 0 0 3]**

**References:**

**MME 4061: MANAGEMENT INFORMATION SYSTEMS [3 0 0 3]**
Importance of MIS, Evolution of MIS, Computers and MIS, Typical Management Information Systems, Organizational and Information System Structure, Management and Decision making, Information Support for functional areas of management, Impact of Business on information systems, Key ingredients of success, Organizing Information Systems, Computer hardware and Software, Telecommunications, Database management, Transaction, Processing and Reporting, Decision making and decision support system, AI and Expert system, Office information system, MIS as technique for programmed decision, Strategic and project planning, Conceptual design, Detailed design, Implementation, Evaluation and Maintenance, Controlling of IS, System concept, Case study in Hostel, Hospital, Hotel, Stores, Production Industries.

**References:**

**MME 4074: MATERIALS CHARACTERIZATION [3 0 0 3]**

**References:**

**MME 4092: MATERIALS MANAGEMENT [3 0 0 3]**
Concepts, evolution, importance and scope of materials management, organizational structure, man power planning, functions of management, principles of organisation, motivation, factors and techniques of materials planning & budgeting and budgetary control, purchasing, purchasing policy, purchasing parameters and purchasing procedures. Strategic materials planning, JIT production planning, strategic materials planning, Criteria for make or buy decision, spare parts management including equipment selection, codification and standardization. Capital equipment planning and capital equipment decision and purchase of capital equipment's.

**References:**

**MME 4075: MEMS AND NANOTECHNOLOGY [3 0 0 3]**

**References:**

**MME 4076: MICRO MACHINING [3 0 0 3]**

**References:**

**MME 4079: NON DESTRUCTIVE TESTING [3 0 0 3]**

**References:**
3. NDT Hand Books Vol. 1 – 10, American Society for Nondestructive Testing (ASNT), USA.
MME 4078: NON-CONVENTIONAL ENERGY SOURCES [3 0 0 3]
Potential of renewable energy resources and applications, Solar radiation at the earth’s surface, Measurement of solar radiation, Solar radiation geometry, Empirical equations for predicting the availability of solar radiation, Thermal applications of solar energy, Liquid flat-plate collectors, Principles of wind power, Types of windmill, Site selection, Betz theory, Forces on the blades and thrust on turbines, Types of biomass, Types of biogas plants, Influencing factors for the generation of biogas, Aerobic fermentation, Ethanol production – from wood by acid hydrolysis and from sugar cane, Thermo-chemical method of bio- conversion, Pyrolysis method, Power from the wave, Wave energy conversion by floats - Oscillating float air pump and Buoy-Dolphin type, Tidal energy conversion by single pool system and two pool system,OTEC, Small scale hydel plant, Geothermal energy conversion, Direct energy conversion, Conversion of thermal energy into electricity, thermo-electric converters, Thermo-ionic converters, Conversion of chemical energy into electricity–Fuel Cells, H2-O2 acidic fuel cell, Conversion of electromagnetic energy into electricity, solar cells.

References:

MME 4082: PLANT ENGINEERING AND MAINTENANCE [3 0 0 3]

References:

MME 4093: RAPID PROTOTYPING [3 0 0 3]
Basic concepts, Comparison of conventional prototyping methods and Rapid prototyping technologies, Definition of Rapid prototyping, Fundamentals of Rapid prototyping and advantages, Overview of existing technologies of prototyping and tooling, Classification of Rapid prototyping systems, State of the technology, Conceptual design, development, prototype, tooling, limitations, Accelerated product development, Rapid prototyping systems, Rapid prototyping data formats, Cost justification, Applications and examples of Rapid prototyping.

References:

MME 4094: THEORY OF METAL FORMING [3 0 0 3]

References:

OPEN ELECTIVES

MME 4305: INTRODUCTION TO OPERATIONS RESEARCH [3 0 0 3]
path, Determination of project duration, Project Crashing. Applications and Limitations of CPM. Project evaluation and review technique, Simulation - Monte-Carlo technique, Problems involving Waiting line situations and Selection of crew members etc.

References:

MME 4306: INTRODUCTION TO QUALITY CONTROL [3 0 0 3]
Definitions of the term quality, Patterns of variation, Causes of variation, Frequency distribution, Measures of central tendency and dispersion, The Normal distribution curve, Inequality theorems, Shewhart's bowl drawing experiments, Control charts for variables (\(X\), \(R\) and \(s\) charts), Type I and Type II Errors, Process capability analysis, Process capability indexes, Control charts for attributes (\(p\), \(np\), \(c\) and \(u\) charts), Acceptance sampling by attributes, Single and Double sampling plans, Operating characteristic curve, Acceptable quality level, Lot tolerance percent defective, Average outgoing quality, Average total Inspection, Average fraction inspected, Producers risk, Consumers risk, Acceptance sampling tables, Conventional and Statistical tolerancing, Precision, Accuracy and Reproducibility of method of measurements, Quality costs.

References:
OPEN ELECTIVES

MCA 4301: INTRODUCTION TO DATABASE SYSTEMS WITH MYSQL [3 0 0 3]

Modeling and Designing Databases, Database Design Process, Entity-Relationship Model, Basic Concepts, Constraints, Design of ER database schema, Reduction of ER to schema, Relational model, Super candidate, primary, foreign key, Schema Diagram, Relational Database design, Functional dependencies, Normal forms, Creating a MySQL Database, Table, Modifying table constraints, indexes, Basic SQL, Inserting Data, Selecting Data, Updating Data, Deleting Data, MySQL Functions, Numeric, String, Date /Time, Advanced Queries, Sorting, Multiple tables, Inner Join, Left Join, Right Join, Natural Join, Nested queries, Generating summaries, COUNT(), MIN(), MAX(), SUM(), AVG(), Group By, Statistical techniques, Calculating Descriptive statistics, Per-Group Descriptive Statistics, Generating frequency distribution, Calculating correlation coefficients, assigning ranks, Stored routines, stored procedure, stored function, Triggers, Events to schedule database actions, Managing users and privileges, Importing and Exporting data, importing data with LOAD data and mysql import, importing csv files, exporting query results, tables, importing XML.

References:

MCA 4302: INTRODUCTION TO VR AND AR TECHNOLOGIES [3 0 0 3]


References:
2. Edward Lavier, Getting started with Unity 5, Packt publishing, 2015.

MCA 4303: INTRODUCTION TO LINUX AND SHELL SCRIPTING [3 0 0 3]

Introduction to UNIX/LINUX Operating System: OS concepts, Linux overview, key features of Linux, pros and cons of Linux. Processes: Processes and Files, I/O redirection and pipes, process creation, process attributes standard process file descriptors. File and Process


References:

MCA 4304: INTRODUCTION TO DATA ANALYTICS [3 0 0 3]


References:
Minor Specialization: Computational Mathematics

MAT 4051: APPLIED STATISTICS AND TIME SERIES ANALYSIS [2 1 0 3]
Stochastic and deterministic dynamic mathematical models – forecasting and control, transfer function models, models for discrete control systems. Basic ideas in model building- linear and multiple linear regression. Basic concepts in stochastic processes and Markov chains, Mean square distance, mean square error prediction, prediction of covariance stationary process, ergodic theory and stationary process, applications of ergodic theory; spectral analysis of covariance stationary processes, Gaussian systems, stationary point processes, level crossing problems. ARIMA models, Autoregressive models, moving average models, duality, model properties, parameter estimates, forecasts. Volatility models: ARCH and GARCH modelling, testing strategy for heteroscedastic models, volatility forecasts, Black Scholes model.

References:

MAT 4052: COMPUTATIONAL LINEAR ALGEBRA [2 1 0 3]

References:

MAT 4053: COMPUTATIONAL PROBABILITY AND DESIGN OF EXPERIMENTS [2 1 0 3]
Sampling and sampling distributions, Most powerful tests, Uniformly most powerful tests, Likelihood ratio tests, The sequential probability ratio test, Randomized Designs, Inferences about the differences in Means, Paired Comparison Designs, Inferences about the variance of normal distributions, Monte Carlo estimation methods. The analysis of variance, RCBD, LSD and Related Designs, The Graeco - Latin square Design, Balanced Incomplete Block Designs, PBIBD Introduction to Factorial Designs, The Two Factor factorial design, Blocking in a factorial design, 2^k Factorial Design, Blocking and Confounding in the 2^{k} Factorial Design, Partial Confounding. Two level fractional factorial designs, three level and mixed level factorial and fractional factorial designs, Fractional Design, Confounding in the 3^k Factorial Design, Fractional replication of the 3^k Factorial Design, Factorialts with mixed levels.

References:

MAT 4054: GRAPHS AND MATRICES [2 1 0 3]

References:

OPEN ELECTIVES

MAT 5301: APPLIED GRAPH THEORY [2 1 0 3]
References:
1. F. Harary, Graph theory, Narosa Publishers
2. Narisgnd Deo, Graph theory with applications to Engineering and Computer Science, Prentice Hall.
3. Robin J. Wilson, Introduction to Graph theory, Logman

MAT 5302: APPLIED LINEAR ALGEBRA [2 1 0 3]

References:
2. Gilbert Strang, Linear Algebra and its applications, Thomson learning
3. David C. Lay, Linear Algebra and its applications, Pearson Education

MAT 5303: APPLIED NUMERICAL METHODS [2 1 0 3]

References:
2. Carnahan, Luther and Wilkes: Applied Numerical Methods, John Willey

MAT 5304: MATHEMATICAL MODELLING [2 1 0 3]

References:
3. J N Kapur Mathematical models of environment, INS Academy, New Delhi

MAT 5305: OPTIMIZATION TECHNIQUES [2 1 0 3]

References:
2. PK.Gupta& Man Mohan - Operations Research - Sultan Chand & Sons
3. HamdyA.Taha - Operations Research PHI

MAT 5306: STOCHASTIC PROCESSES AND RELIABILITY [2 1 0 3]

References:
Minor Specialization: Business Management

HUM 4051: FINANCIAL MANAGEMENT [2 1 0 3]

References:

HUM 4052: HUMAN RESOURCE MANAGEMENT [2 1 0 3]
Overview: Collective bargaining and maintaining Industrial health.

References:

HUM 4053: MARKETING MANAGEMENT [2 1 0 3]

References:

HUM 4054: OPERATIONS MANAGEMENT [2 1 0 3]
Introductions to operations management – process view and supply chain view, types of production activities, competitive priorities and capabilities. Break-even analysis, evaluating services or products, evaluating processes - make or buy decision, decision making under risk, and decision trees. Introduction to forecasting, importance and uses of forecasting, demand patterns, demand management options, judgement methods, causal methods - linear regression, time series method – naïve method, moving average, weightage moving average, and exponential smoothing curve. Planning long-term capacity, measures of capacity and utilization, economies of scale, diseconomies of scale, capacity timing and sizing strategies, sizing capacity cushions, timing and sizing expansion – expansionist strategy, wait and see strategy, and a systematic approach to long term capacity decision. Levels in operations planning and scheduling across the organization, sales and operation planning strategies- chase strategy, level strategy, operations planning using linear programming technique, scheduling job and facility scheduling, and work for scheduling. Theory of constraints, managing bottle necks in manufacturing and service processes, identifying bottle necks, relieving bottle necks, drum buffer rope system, and managing constraints in a line system. Supply chain design across the organization, supply chains for services and manufacturing, measures of supply chain performance - inventory measures, financial measures, inventory and supply chains - pressures for small inventories, pressures for large inventories, types of inventory, inventory reduction tactics, and inventory placement. Costs of quality, total quality management, acceptance sampling, statistical process control - control charts, and process capability. Continuous improvement using lean systems, different types of wastes, strategic characteristics of a lean system, designing lean system layout, and Kanban system.

References:
OPEN ELECTIVES

HUM 4301: COMMUNICATIVE ENGLISH [3 0 0 3]
(Offered for Lateral Entry Students only)
Common Errors in English: Subject Verb Agreement; Uses of Tenses / Sequence of Tense; Prepositions; Articles; Special Usages; Creative Writing Essay: Types of Essays, Argumentative Essay, Descriptive/Expository/Narrative Essays; Reading Comprehension; Dynamic text; Critical Evaluation; Group Discussions; Presentation Skills; Essay writing.; Audio texts/speeches - Practice listening skills - summary, commentary, listening exercises. Video Speeches - Theme based speeches - motivational, informative, technical, and persuasive, discussions. Speech - Elements of a good speech, types of speeches, model speech, Speech exercises, individual presentations, peer and facilitator feedback. Formal/Informal communication. Communication Styles - formal and informal, standard English and variations in usages, examples and analysis of faulty usages; Correspondence: formal/informal letters and emails.

References:
2. Thompson AJ & Martinet AB., A Practical English Grammar, OUP.

HUM 4302: FILM STUDIES [2 1 0 3]
History of invention of motion pictures - Daguerr, Muybridge, Edison, Skandanowsky Brothers, Lumieres; Evolution of film - Lumieres, Melies, Porter, Griffith, Basic techniques - Mise-en-scene, Mise-en-shot, Deep focus Photography, Longtake, Continuity, Editing, Montage, German Expressionism; French Impressionism; Soviet Montage cinema; Hollywood cinema, Italian Neo-realism; French Nouvelle Vague, Documentary, Directors - Eisenstein, Kurosawa, Godard, Chaplin, Bergman; Mohsen Makhnabakt, Majid Majidi, Kieslowski, Zhang Yimou. Kim Ki Duk. "New Wave" Cinema in India - Bengali; Malayalam; Kannada; Hindi; To be screened - Bicycle Thieves, The 400 blows, Rashomon, Wild strawberries, Battleship Potemkin, Cabinet of Dr. Caligari, The kid, Children of heaven, Hero, Ghataashraddha, Pathemashralchi, Mathilukal.

References:

HUM 4303: GERMAN FOR BEGINNERS [3 0 0 3]
Text selections, dialogue and exercises which have been designed to give the absolute beginner grounding in the rudiments of the German language, as well as providing background information about the history, life and culture in Germany. Introduction to the German alphabet and the German language - dialogues & conversations - pronunciation, basic vocabulary lists - key points of grammar - background information about the history and culture of Germany - exercises on vocabulary, grammar and German culture - reading & listening comprehension.

References:

HUM 4304: BUILDING BRIDGES: INDO-EUROPEAN INTERCULTURAL DYNAMICS [3 0 0 3]
The challenges of Intercultural communication - interacting in a diverse world, understanding cultures, alternative views of reality, cultural stereotyping, Foundational Theories in Intercultural Communication - Edward Hall, Samovar, G Hofstede, Understanding cultural Dimensions and Cultural Stereotyping- collectivism/ individualism, power distance, masculine/feminine, cultural metaphors, Intercultural Business Communication Competence - The Role of Language in Intercultural Business Communication, Nonverbal Language in Intercultural Communication, Cultural influence on interpersonal communication, Intercultural Dynamics in the multicultural organizations.

References:

HUM 4305: INTERPRETATION OF LITERARY TEXTS [3 0 0 3]
Texts-static, dynamic, cryptic and delphic; Language of literature; Form and structure; Literature verses popular fiction; Text and discourse; Authors and critics; Theories and approaches to literary texts: Formalism, Structuralism, Marxism, Feminism, Deconstruction; Ideational functions and textual Functions; Class, gender and sexuality; Race and nationality; Genre, phonological deviations - sound patterns and figures of speech; Pragmatic approach to literature; Understanding syntax, Lexical and syntactic analysis of literary texts; Point of view in literary texts and foregrounding; Prediction and making sense of a text; Stylistic analysis of a novel; Kinds of meaning, Rhetorical structure; Pragmatics and discourse analysis; Interpreting cohesive devices and complex functional values; Stylistic approach to literature; Elements of literary style; Stylistic analysis of selected short stories, Poems, Novels and Plays; Genre, the plot setting, characterization, tone and themes; Stylistics and its implications on narrative techniques; Intertextuality and conceptual blending; Identifying patterns in the texts; Meaning making process in literature; Imagery, metaphor as a mode of thought; Coherence and Cohesion; Context, turn taking and Adjacency Pair; Forms, Discourse markers, Lexical cohesion and presupposition; Recognizing text organization; Critical texts, Shared assumptions on critical texts; The role of schema and the concept of speech acts in literary texts.

References:
HUM 4311: MANAGEMENT INFORMATION SYSTEMS [3 0 0 3]

Management information system: Introduction to management, information and system. System concepts, general model of a system and types of systems. Evolution of MIS, models and resources used in the MIS model. Structure of MIS, operating elements of an information system, synthesis of the structure. Information systems for different applications: Transaction processing systems. Human resource management systems and Marketing-application areas. Production planning and Office automation systems. Role of management information in decision making: Concepts of decision making, Decision making process and information needs at different levels of management. Herbert A. Simon model. Phases in the decision making process, Programmed vs non-programmed decisions, General model of human as an information processor, Allen Newell Simon model. Decision support systems -structure, elements and working. Information as a strategic resource. MIS as a technique for making programmed decisions: Behavioral models of the decision maker and methods. MIS support for decision making. Role of MIS in Organizations -recent trends and e-commerce applications. Development of customized management information system approaches: SDLC -phases in SDLC, Strategic and project planning for MIS, conceptual design and detailed design phases: general business planning and MIS response. MIS Planning and planning cycle. Conceptual system design and Detailed System design. MIS System Implementation, and Pitfalls: Pitfalls in MIS development: Fundamental weaknesses, soft spots in planning, design problems and review.

References:

HUM 4312: ENTREPRENEURSHIP [3 0 0 3]


References:
References:

**PHY 4304: SOLID STATE PHYSICS [3 0 0 3]**

References:

**PHY 4305: MODERN OPTICS [3 0 0 3]**

References:

**PHY 4306: INTRODUCTORY QUANTUM MECHANICS [3 0 0 3]**
Review of certain basics: Limitations of classical physics, wave-particle duality, De Broglie's hypothesis, matter as wavepacket, Heisenberg's uncertainty principle, Mathematical Formalism: operators; commutation relation; orthonormal functions; eigenvalues and eigenfunctions; the Dirac notation; the postulates of quantum mechanics. The Schrödinger Equation: Introduction, wavefunctions, time dependent Schrödinger equation, conservation of probability, expectation values, Ehrenfest's theorem, time independent Schroedinger equation, stationary states. Schrödinger equation in one dimension: the infinite square potential well; the finite square potential well; the potential barrier; tunneling; the harmonic oscillator. Quantum mechanics in three dimensions: Schrödinger equation in spherical coordinates, separation of variables, the angular equation, the radial equation, Applications (energy eigenvalues and eigenfunctions): the rigid rotator; the hydrogen atom; angular momentum. Identical Particles. Some applications of quantum mechanics in nuclear physics, condensed matter physics, and spectroscopy: alpha decay, nanostructures, STM, vibrational and rotational spectra of molecules etc.

References:
Minor Specialization: Material Science

CHM 4051: CHEMICAL BONDING [3 0 0 3]

References:

CHM 4052: CHEMISTRY OF CARBON COMPOUNDS [3 0 0 3]
Introduction to Organic Compounds: Classification, Nomenclature; Alkenes: Homologous series, Preparation; Cycloalkanes: Ring size and strain, Applications; Alkenes: Markovnikov and anti-Markovnikov addition reactions, Reduction, applications; Alkynes: Acidity, preparation, Reduction of alkyne, applications; Alkyl halides: SN1, SN2, E1 and E2 reaction mechanisms; Alcohols: Classification, Acidity, organo-metallic reagents; Aromatic compounds: Electrophilic and nucleophilic substitution reactions; Mechanism of some named reactions; Carbonyl compounds: aldehydes and ketones, carboxylic acids and carboxylic acid derivatives; Heterocyclic compounds: Nomenclature, synthesis and reactivity of thiophene, pyrrole and furan; Carbon materials: Fullerenes, carbon thin films, nanotubes and carbon fibers; Carbon nanotubes: SWNT, MWNT, synthesis, properties and applications; Carbon nanomaterials applications.

References:

OPEN ELECTIVES

CHM 4301: ANALYTICAL METHODS AND INSTRUMENTATION [3 0 0 3]

References:

CHM 4302: FUNDAMENTALS OF INDUSTRIAL CATALYTIC PROCESSES [3 0 0 3]

References:

CHM 4303: SUSTAINABLE CHEMICAL PROCESSES AND PRODUCTS [3 0 0 3]
Introduction and principles of green chemistry, Examples, Atom economy, carbon efficiency, life cycle analysis, sustainable products, process and synthesis catalysis and green chemistry, examples of fine and bulk chemicals production, catalysts for clean technology. Application of ecofriendly approach to waste treatment. Cleaner production processes, clean synthesis in lab Scale, industrial examples, use of ecofriendly energies. Bio-pesticides, polymers & pharmaceutical products. Electrochemical synthesis, Alternate reaction media using water and other green solvents, ionic liquids & supercritical fluids; phase transfer catalysis.

References:
IIE 4301: ART APPRECIATION [3 0 0 3]
How to read a visual, how to enjoy or feel an art form, what is Creative Thinking? Indian Art: Heritage & Culture; Art Appreciation: Western Art, Artist & Art Movements: Raja Ravi Verma, Tagore, Da Vinci, Van Gogh; Aesthetics: Beauty, Feel & Expression; Art & Science, Art & Film; Art: Freedom & Society; to be an art literate. A journey to immerse in the world of Art.

IIE 4302: INDIAN CULTURE AND CINEMA - AN INTRODUCTION [3 0 0 3]
Introduction to idea of Culture, Identity and tradition, Indian Cultural History, Indian cultural history, Time and space, Indian Art and heritage, Indus valley civilization – Indian Independence, Post-colonial India, Modern India, Indian Cinema, Body, language and feel, Film and culture, Evolution, Interpretation and Reflection, Indian Cinema, Media and the medium, Pioneers and classical films, Culture and art of cinema, Culture, Cinema and Society, Revolutions, ideas, innovations, Culture, Cinema and Peace, Message, purpose and the challenge.

IIE 4304: CORPORATE FINANCE [3 0 0 3]

References:

IIE 4305: INTERNATIONAL BUSINESS MANAGEMENT [3 0 0 3]
Historical perspective of international business, International business environment, Modes of entering international business, Cross-Culture and dynamic market understanding, Differences in Culture, Theories of international business, World Bank, World trade organization, Multinational Corporations and their involvement in International Business, Tariffs and quotas, Balance of Payment Account.

References:

IIE 4306: BRAND MANAGEMENT [3 0 0 3]
Introduction to brand management, Developing a brand strategy, Brand resonance and brand value chain, Designing and implementing brand marketing programs to build brand equity, Measuring and interpreting brand performance, Designing and implementing brand architecture strategies, Managing brands.

References:

IIE 4307: YOGA [3 0 0 3]
Aim, Objectives, Meanings and Definitions of Yoga, History of Yoga, Concepts and misconcepts of Yoga, Schools of Yoga, Ashtanga Yoga

IIE 4308: HEALTH ECONOMICS [3 0 0 3]

References:

IIE 4309: DIGITAL MEDICINE [3 0 0 3]
Present day practice of medicine. Limitations of scalability in the present framework. Introduction to computing, algorithms, big data, semantic web, mobility. Communication-WAN/LAN, 3G/4G and 5G. Patient/Electronic Health records. Experience with these records elsewhere. Wearables, the physics of data capture. Practical demonstration of wearable Genomics, an introduction. Computational genomics including the software. Imaging – an introduction-ionizing and non-ionizing. Imaging software and science of diagnosis. How all the four pillars-PHR/EHR, Wearables, Genomics and Imaging come together with software as the glue to change the world of medicine.

References:
IIE 4310: MEDICAL EMERGENCY AND FIRST AID [3 0 0 3]
Principles of First Aid, First aid kit and equipment, emergency drugs, scene assessment, safety and identifying hazards, patient assessment, Basic Life Support and AED, triage, extrication/stretchers, ambulance. Describe the causes, signs and symptoms and management of respiratory emergencies, acute gastro-intestinal emergencies, musculoskeletal emergencies, dental, ENT and eye emergencies, renal emergencies, nervous system emergencies, hematological emergencies, endocrine emergencies, toxicological emergencies, environmental emergencies, pediatric emergencies, psychiatric emergencies, obstetrical emergencies

References:

IIE 4311: LIFE STYLE MODIFICATION AND COMPLEMENTARY AND ALTERNATIVE THERAPIES [3 0 0 3]
Principles and concepts of life style modification and various complementary and alternative therapies: Demonstrate skill in performing different yoga asanas, guided imagery/Progressive muscle relaxation, meditation & Pranayama, reflexology, massage therapy, aerobics, laughter therapy

References:
2. M.M.Gore. Anatomy & Physiology of yogic practices; (5e), New age book.

IIE 4312: INDIAN CUISINE AND CULTURE PRACTICAL [3 0 0 3]
Introduction to Indian cuisine, Basic Indian gravies, Rice cooking. Preparation of various rice products, Tandoor Cooking, Indian sweets, Comfort Food, Regional and sub-regional cuisine.

IIE 4313: FOUNDATION COURSE IN BAKING AND PÂTISserie PRACTICAL [3 0 0 3]
Introduction to Pâtisserie and Baking Principles, Special emphasis placed on the study of ingredient functions, Students will have the opportunity to apply basic baking techniques, Understanding fundamentals of yeast dough production. Emphasis on the application of ingredient functions, product identification and recipe interpretation occurs throughout the course, Pastry Basics and Pie dough. The fundamental production of classical European pastry based desserts are included, Techniques of Cake Making, Techniques of Cookie making. The course emphasizes the preparation and makeup techniques of various cookies.

References:
1. Wayne Gisslen – Professional Baking, (5e), John Wiley USA.
2. Haneman L.J. Bakery: Flour Confectionery HEINMAN.
3. Mermaid Books The Book Of Ingredients DOWELL PHILIP.
4. John Wiley Understanding Baking AMENDOLA JOSEPH.
5. New Age International, A Professional Text to Bakery and Confectionery, KINGSLEE JOHN.
7. Charrette Jacques, Great Cakes and Pastries, TEUBNER CHRISTIAN.
9. Joseph Amendola, Understanding Baking, (3e), NICOLE REES.
10. Culinary Institute Of America, Baking and Pastry: Mastering the Art and Craft, JOHN WILEY.

IIE 4314: GLOBAL CUISINE & CULTURE- PRACTICAL [3 0 0 3]

References:
1. The Professional Chef - The Culinary Institute of America
2. Practical Cookery - Kinton, Ceserani and Foskett
3. Food Production Operation - Parvinder S. Bali
4. Professional Cooking - Wayne Gisslen
5. Cookery for the Hospitality Industry - Dodgshun Peters
6. Modern Cookery - Thangam E Phillips

IIE 4315: REPORTING AND WRITING [3 0 0 3]
Introduction to news writing news in different media, news, definition of news, news values; types of news other theoretical issues relating to news writing. News Reporting Basic of news writing: structure of news, reporting/working on a beat. Reporting for news agency, periodicals and magazines. Interviewing: doing the research, conducting the interview, types and formats of interviews, writing interviews

References:
**IIE 4316: INTRODUCTION TO ADVERTISING & PUBLIC RELATIONS [3 0 0 3]**
Introduction to advertising; Evolution and history of advertising; Influence of advertising on society and ethics. Advertising as part of marketing mix; Structure and types of ad agencies; Advertising planning; creative strategy and implementation (media strategy). The essentials of advertising on different media platforms – print, broadcast, internet and new media; discuss the difference in planning and execution using examples or campaign case studies. Public Relations: scope, definition; evolution; establish difference between PR and advertising; Identifying stakeholders and various Public Relation tools. Steps in developing a PR program/campaign-stating the problem, planning and programming, action and evaluation; Crisis communication; Ethical issues in Public Relations.

**References:**

**IIE 4317: BASIC PHOTOGRAPHY [3 0 0 3]**

**References:**
1. Basic Photography – Newsnes
2. The Hamlyn Basic Guide to Photography – Hamlyn
3. Hamlyn Encyclopedia of Photography – Hamlyn
4. Photographing People – Guglielmeazi
5. History of Photography – Cyrenshem G R
6. Photo Journalism – Rothsteline
7. Techniques of Photo Journalism – Miten Feinberg
8. Freelance Photography – Jechsend Gedsey
9. Picture Editing – Stanley E Kalish and Clifton C Edom
11. 1000 Ideas for better News Picture – High Sidley and Rodney Fox

**IIE 4318: MEDIA PRODUCTION TECHNIQUES [3 0 0 3]**

**References:**
1. Gerald Millerson, “Effective TV production”
3. Hamlyn “Basic guide to photography”
4. Ralph Milton “Radio programming – a basic training manual”
5. Tomlinson Holman “Sound for film and television”
6. Reporting and writing by Melwin Mencher

**IIE 4319: GRAPHIC & SKETCHING [3 0 0 3]**

**List of Practical's:**
- 10 Drawings of Human Anatomy Study In Pencil
- 50 Drawings of Gesture Drawing In Pencil
- 5 Contour Drawing
- 2 Still Life Pencil Shading
- 2 Color Still Life
- 2 Layout Design

**References:**
1. Mastering Composition: Techniques and Principles to Dramatically Improve Your Painting (Mastering (North Light Books)) Hardcover – 25 Jan 2008 by Ian Roberts
2. Layout Essentials: 100 Design Principles for Using Grids (Design Essentials) Paperback – 1 by Beth Tondreau
3. Pencil Drawing: Learn how to develop drawings from start to finish with techniques for shading, contrast, texture, and detail (Artist's Library) Paperback – 1 Jan 1988 by Gene Franks
4. Drawing the Head and Figure – Jack Hamm
5. Dynamic Anatomy – Burne Hogarth
6. The artists complete guide to Human figure Drawing – Anthony Ryder
7. Human Anatomy – Victor Perard

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